National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, tests publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.

NL-339 (r. 86/04)

Canada

THE UNIVERSITY OF ALBERTA

UNDERACHIEVING AND ACHIEVING GIFTED STUDENTS: LOCUS OF CONTROL AND LOCUS OF CAUSALITY

by

ROBERT JAMES McCLELLAND

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1987

Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

ISBN 0-315-41092-2

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Robert James McClelland

TITLE OF THESIS: Underachieving and Achieving Gifted Students: Locus of Control and Locus of Causality

DEGREE: Master of Education

YEAR THIS DEGREE GRANTED: 1987

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed) .....

PERMANENT ADDRESS:

519 B MICHENER PARK

EDMONTON ALBERTA

T6H 4M5

Date June 29 1987

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Underachieving and Achieving Gifted Students: Locus of Control and Locus of Causality submitted by Robert James McClelland in partial fulfillment of the requirements for the degree of Master of Education.

.....
Supervisor

.....

.....

Date June 16, 1987

Abstract

This study examined locus of control and locus of causality in underachieving and achieving gifted children. The sample was comprised of students in grades 6, 7, 8, and 9 who were defined as gifted through the use of the Lorge-Thorndike Intelligence Test. A multiple regression procedure and predictive variable approach based on I.Q., age, and gender were used to determine underachievement and achievement from the scores on the Canadian Test of Basic Skills. Locus of control was measured through the Crandall Intellectual Achievement Responsibility Questionnaire (IAR) and locus of causality was measured through a comparison of two Unusual Uses Tasks, the first task without reward and the second task with reward.

No significant differences were found between the underachieving and achieving gifted subjects across grades on internal positive, negative, and total locus of control. Similarly, no significant differences were found between the two groups on locus of causality. When internal locus of control was correlated with locus of causality, there was found to be no significant correlation between the two tests. There were no significant interaction effects with either locus of control or locus of causality. Locus of control and locus of causality measurements did not differentiate underachieving from achieving gifted students in this sample.

Significant differences for positive internal control as opposed to negative internal control were exhibited by both underachieving and achieving gifted students. Students assumed greater responsibility on positive internal control than on negative internal control. Finally, significant differences were found between the locus of causality with reward task with repeated measures comparing task one to task two. Underachievers and achievers both performed significantly better in the task with reward than with the task involving no external reward.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to the many persons who, in various ways, have helped me complete this study.

I am grateful to my supervisor, Dr. Carolyn Yewchuk, for her analytic ability, guidance, and patient understanding. Her insights into the nature of the study, her professionalism, and her willingness to devote considerable time made it possible to see the study to its conclusion

The committee members, Dr. Robert Mulcahy and Dr. Jim Parsons, were both generous in their assistance and support. I have appreciated Dr. Robert Mulcahy's willingness to always find the time in his full schedule to discuss the results of this study. I am indebted to him for his openness in sharing his ideas and his data. Dr. Jim Parsons's suggestions, literary expertise, and encouragement have been a valuable asset throughout this research.

Recognizing the increased demands upon today's educators, I am indebted to the Edmonton Catholic School System for allowing testing to be conducted in their schools and for their cooperation in facilitating the process. The promotion of research efforts by the Edmonton Catholic School System is encouraging. Mrs. Annette Stremecki , Coordinator of Testing and Research, has been of particular support and encouragement throughout this research. Her public relations for the Edmonton Catholic School System is commendable. Miss Laurie Pelkie, Consultant for Gifted Education, has similarly been supportive of the study. Appreciation is also extended to the schools and the parents for their support and interest in the research.

I am indebted to Patricia, my wife, for her assistance, encouragement, and love that have seen me through this research. Thanks is extended to our young daughter Erin, who helped to keep this study in proper perspective.

The final acknowledgement is to my Creator, my source and my strength.

TABLE OF CONTENTS

CHAPTER PAGE

I.STATEMENT OF THE PROBLEM 1

A.Introduction to the Problem 1

B.The Problem 2

C.Limitations 5

II.REVIEW OF THE LITERATURE 7

A.Two Approaches: Locus of Control and Locus of Causality 7

B.Locus of Control 10

C.Locus of Causality 18

D.Giftedness and Underachievement 22

E.Summary 26

F.Definitions of Terms 28

III.METHOD AND DESIGN 31

A.Subjects 31

Defining Achievement and Underachievement with the Prediction Model 32

Analysis for Determining the Equivalence of Groups Based on the Canadian Lorge-Thorndike 36

Analysis for Determining Differences Between Groups Based on the Discrepancy Scores 40

Summary 41

B.Screening Instruments 41

Canadian Lorge-Thorndike Intelligence Test 42

Canadian Test of Basic Skills 43

C.Test Instruments 43

Intellectual Achievement Responsibility Questionnaire 44

Unusual Uses Task 47
D.Collection of Data 49
E.Analysis of Data 51
F.Hypotheses 52
IV.RESULTS 55
A.Differences in Total Internal Locus of Control 55
B.Comparison Between Subscales of Internal Locus of Control 56
C.Differences in Internal Locus of Causality 59
D.Relationship Between Locus of Control and Locus of Causality 61
E.Summary 63
F.Supplementary Analyses 63
Gender and Achievement with Internal Locus of Control and Locus of Causality 63
Correlation Matrix for Locus of Control, Locus of Causality, Intelligence, and Achievement 65
V.DISCUSSION 69
A.Summary of the Study 69
Differences in Total Internal Locus of Control 69
Comparisons between Subscales of Internal Locus of Control 72
Differences in Internal Locus of Causality 74
Relationship between Locus of Control and Locus of Causality 75
Supplementary Analyses 76
B.Implications for Future Research 77
REFERENCES 80
APPENDIX I The Crandall Intellectual Achievement Responsibility Questionnaire 88
APPENDIX II Torrance Tests of Creativity (Unusual Uses Tasks) 92
APPENDIX III Means and Standard Deviations of Dependent Measures 93

LIST OF TABLES

Table — Page

1. Weiner's Locus of Control 10
2. Means and Standard Deviations Across Grades for Total Discrepancy For All Gifted Students 34
3. Breakdown of Subjects by Grade, Achievement, and Gender 35
4. One Factor Anova of Achievement Status on Lorge-Thorndike Full Scale 36
5. Lorge-Thorndike Full Scale Means, Standard Deviations, and Standard Errors Across Grades 37
6. One Factor Anova of Achievement Status on Lorge-Thorndike Verbal Scale 38
7. Lorge-Thorndike Verbal Means, Standard Deviations, and Standard Errors Across Grades 38
8. One Factor Anova of Achievement Status on Lorge-Thorndike Non-Verbal Scale 39
9. Non-Verbal Means, Standard Deviations, and Standard Errors Across Grades 39
10. One Factor Anova for Achievement Status and Total Discrepancy Score 40
11. Odd-Even Reliability of the Lorge-Thorndike Intelligence Test 42
12. Correlations of IAR Subscale Scores 46
13. Two Factor Anova of Achievement Status and Grades on Total Internal Locus of Control 56
14. Two Factor Anova of Achievement Status and Grades on Positive Internal Locus of Control 56
15. Two Factor Anova of Achievement Status and Grades on Negative Internal Locus of Control 57
16. Two Factor Repeated Measures Anova for Internal Positive and Negative Locus of Control 59

17. Two Factor Anova of Achievement Status and Grades on the First Unusual Uses Task 59
18. Two Factor Anova of Achievement Status and Grades on the Second Unusual Uses Task 60
19. Locus of Causality Two Factor Repeated Measures Anova for First Task and Second Task 61
20. Scattergram of Locus of Control with Locus of Causality 62
21. Two Factor Anova for Total, Positive, and Negative Locus of Control and Locus of Causality 64
22. Correlation Matrix for Positive, Negative, and Total Locus of Control (LC) 67

CHAPTER I

STATEMENT OF THE PROBLEM

A. Introduction to the Problem

Why do some gifted children excel in school while others do not? What characteristics differentiate these underachievers and achievers? Is it possible that perception of control (locus of control) and motivational (locus of causality) differences between underachievers and achievers can account for the discrepancy between ability and achievement? This study has been undertaken to determine whether there are differences in locus of control and locus of causality in underachieving and achieving gifted children.

Giftedness has been historically defined in terms of culturally relevant societal structures and values. To the ancient Greeks, the orator personified the gifted individual. To the Romans, the engineer and soldier were honored and acclaimed to be most talented. The present culture conforms to this pattern of defining giftedness in its own image. Thus definitions generally include a verbal and performance quality along with a recognition that gifted individuals possess greater potential ability to do well in academic environments.

Acceptable current definitions of giftedness range from descriptors involving very high intelligent quotients, to academic excellence, to precocity. Kirk (1972) defines gifted individuals as possessing "superior ability to deal with facts, ideas, or relationships" (p. 109). Possessing an above-average ability, creative talents, and task commitment forms the basis of the Renzulli (1978) model of giftedness. Cohn (1981) lists a hierarchical model comprised of intellectual, artistic, social, and general characteristics.

Perhaps the most extensively quoted taxonomy of giftedness has been suggested by the United States Office of Education (Education Consolidation Act, 1981). It defines the gifted as "possessing demonstrated or potential abilities that give evidence of high performance capability in areas such as intellectual, creative, artistic, leadership capability, or specific academic fields, and who require services or activities not ordinarily provided

by the school in order to fully develop such capabilities" (Sec. 582). Because this definition includes potential as well as demonstrated ability, it has resulted in the recognition that giftedness is a quality that can exist prior to visible signs of exceptionality and, as such, has opened the door to providing opportunity for fostering the potential of all gifted students including the underachieving.

Definitions of the underachieving gifted vary extensively. Gallagher (1979) defined underachievement in gifted students as those with either a gap between achievement test scores and intelligence test scores or a gap between academic grades and intelligence test scores. Clark (1979) considered the gifted underachieving child to be "...someone who has shown exceptional performance on a measure of intelligence and who, nevertheless, does not perform as well as expected for students of the same age on school related tasks" (p. 279). There is general agreement that definitions of gifted underachievement should include a discrepancy between potential and actual academic performance.

One of the problems that needs to be addressed in the area of the gifted is the identification of factors that contribute to underachievement. A promising and influential area in contemporary psychology has been the examination of the effects of locus of control and locus of causality as a contributing factor to achievement (Wong & Sproule, 1984). However, there has been little investigation of locus of control and locus of causality with the underachieving gifted population.

B. The Problem

The education of the intellectually gifted child has been recognized as a challenge as well as a responsibility. Of particular concern with this group are those students who are underachievers. Gallagher (1975) presents the challenge to the underachieving individual and to the educator. He states:

> One way to look at the underachiever is that he is in the middle of a circle of barbed wire. It makes up his total environment, and all the elements of his environment have contributed to the building of this wire circle - his family,

> his friends, his school, and most important, himself. Any movements that he attempts to make to get out of the barbed wire are going to be painful to him. Sometimes it is more comfortable to sit quietly and passively in the middle of this trap and bemoan his own fate than to risk getting scratched trying to get out (p. 353).

Only through a better understanding of personality characteristics associated with underachievement and the nature of the underachiever will efforts be effective to allow gifted underachievers to circumvent the barbs that have entrapped them.

The potential contribution of educational systems to the development of the underachieving gifted student and the prevention of emotional handicaps will only occur as a better understanding of the nature of the underachieving gifted child has been researched. Horney (1936) presented the importance of allowing individuals to achieve their potential. She states, "Failing to live up to one's potentialities prevents the individual from attaining self-fulfillment, the self-actualization of which he is capable, and thus prevents his becoming a truly integrated person" (p. 37). Studies which examine the characteristics of the underachieving gifted population may assist in formulating an accurate identification profile and provide a basis for measuring existing programming.

Newman, Dember, & Krug (1973) describe underachieving in the gifted in terms of personality. They believe that:

> ...intelligence is not purely defined by a set of ego functions [development] any more than achievement is determined solely by motivational factors. Nor can the relationship between intelligence and the motivation to achieve be expressed in simple arithmetic terms. The study of underachieving gifted children leads us to consider the ever-changing, subtle, complex, and mutually inhibitory or facilitating interactions that occur between intelligence and achievement within the psychodynamic matrix of the developing personality (p. 85).

Further investigation into the area of personality differences between gifted underachievers and achievers has been researched by Kanoy, Johnson, and Kanoy (1980) and Davis and Connell (1985) with regard to locus of control. Significant differences on internal locus of control between gifted underachievers and gifted achievers were noted by Kanoy, Johnson, and Kanoy(1980). However, contrary findings were reported by Davis and Connell (1985) in their analysis of underachieving gifted students' self-perceptions and feelings.

Their study revealed that underachievers were significantly higher on internal locus of control than achievers. In view of these discrepant findings, further research is required to help clarify the effects of locus of control with underachievers.

With a general population, locus of control has been found to have a high predictive positive correlation with academic achievement (Duke & Nowicki, 1974; Messer, 1972). The basis for a predictive relationship between locus of control and academic achievement is stated by Lefcourt (1976):

> The link between locus of control and cognitive activity appeals to common sense. In like fashion, common sense suggests that a disbelief in the contingency between one's efforts and outcomes should preclude achievement striving. Without an expectation of internal control, persistence despite imminent failure, the postponement of immediate pleasures, and the organizing of one's time and efforts would be unlikely. Common sense would dictate that these characteristics, essential to any prolonged achievement effort, will occur only among individuals who believe that they can, through their own efforts, accomplish desired goals; that is, individuals must entertain some hope that are prerequisite for achievement (p. 66-67).

Students who have a high internal locus of control, who believe they are in control or responsible for events occurring in their lives, appear to exhibit superior performance in achievement behavior. Conversely, those students with a proclivity to external control, who believe that others are responsible for the events occurring in their lives, demonstrate significantly less success in achievement behavior.

In an examination of concepts of locus and achievement behavior two themes emerge, locus of control and locus of causality (Ickes & Layden, 1978). Locus of control is concerned with the extent to which individuals perceive they have control or mastery over events. Locus of causality, on the other hand, emphasizes the cause of an action. The cause of an action may reside either internally, within the individual, or externally, influenced by other persons, situations, or rewards.

In summary, there is a paucity of research on underachieving and achieving gifted in the areas of locus of control and locus of causality. Although some studies have investigated the relationship between locus of control and achievement in gifted students,

research has not examined the underachieving gifted in relation to locus of causality or compared the two concepts of locus of control and locus of causality as they relate to a special population. What is required is an investigation of locus of control and locus of causality as they relate to underachievement and achievement of gifted students.

The purpose of this study, then, is to examine locus of control as measured by the Crandall Intellectual Achievement Responsibility Questionnaire (IAR) and locus of causality as measured by two equivalent Unusual Uses Tasks, the first without reward and the second with reward, in gifted underachievers and achievers.

The specific questions guiding this study are as follows:

(1) Do underachieving gifted students differ significantly from achieving gifted students in the area of internal locus of control as measured by Crandall's Intellectual Achievement Responsibility Questionnaire (IAR)?

(2) Are there significant differences in internal locus of control with respect to acceptance of failures versus acceptance of academic success situations?

(3) Do underachieving gifted students respond significantly differently from achieving gifted students on locus of causality as measured through a comparison of tasks with and without reward?

(4) What is the correlation between locus of control and locus of causality among gifted underachievers and achievers?

Underlying the study is the assumption that locus of control and locus of causality are factors that may differentiate underachieving and achieving gifted students. The extent to which people believe they are in control of their fate (locus of control), within realistic limits, determines the extent to which they can cope with stress and pursue challenging situations (Lefcourt, 1982). Similarly, if individuals are deprived of their sense of self-determination or feelings of competence, they are less motivated to learn about themselves from their own experiences, to develop a definite measure of their own worth, and to succeed in meeting the demands of academic tasks (locus of causality).

C. Limitations

The study was limited to students in grades six through nine attending schools

within the Edmonton Catholic School District. The research was limited to one testing period. No qualitative examination was undertaken concerning such factors as the home and non-academic behaviors. The research was restricted to student reaction to specific items related to an internal locus of control questionnaire and a locus of causality comparison of tasks with and without reward. Other than the data that could be obtained through the use of test instruments, and the collection of anecdotal observations useful for interpreting possible errors in testing, the subjects' personal perceptions and values at the time of the testing session were not investigated.

Students were selected for this study on the basis of an intelligence measure (Lorge-Thorndike) and an achievement measure (Canadian Test of Basic Skills). Both tests are group administered and as such are not as reliable as individually administered measures. Although an individually administered test such as the Wechsler Intelligence Scale for Children - Revised (WISC-R) would have been a more accurate assessment of intelligence, the time and expense required for administration of the test to all potentially gifted students was prohibitive. Items on the Canadian Test of Basic Skills may be seen as irrelevant for gifted students creating intervening variables such as a ceiling effect and lower task performance due to boredom. Control for these variables in a group administered test environment is not always possible. Nevertheless, given the research requirement for subjects who would meet the criteria for giftedness and underachievement, the Lorge-Thorndike and the Canadian Test of Basic Skills were appropriate and practical in screening a large pool of students.

CHAPTER II

REVIEW OF THE LITERATURE

A. Two Approaches: Locus of Control and Locus of Causality

Locus of control and locus of causality are two concepts which offer an explanation for patterns of behavior that may affect the performance of gifted individuals thus producing achievement or underachievement. The perception of individuals as to whether they possess power or lack power over the events they experience is the focus of internal and external locus of control. The extent to which individuals strive to be the causal agent or origin of their behavior is the focus of internal and external locus of causality. The concepts of internal and external locus suggest a possible reason for differences in individual actions given the same environment, potential, and event.

The concept of locus of control developed from behaviorist and social learning theories. Locus of control focuses on the degree to which individuals believe themselves to be in control of their actions. As an example, suppose that two students, Ivan and Edward, are attending university. Ivan perceives that he has the ability to accomplish any work assigned to him at university, and with effort he knows he will succeed. Ivan's perception of the situation can be explained in terms of internal locus of control since he believes he is in control of his actions. Events that occur throughout his university career reinforce his belief that he is in control. When he does well in a course he believes it is a result of his ability and effort. When he does poorly he believes it is through no fault but his own. On the other hand, Edward perceives the task demands of university in terms of his position in relation to his peers. If Edward's friends can do this course then he believes that, with a little luck, he will be able to complete the requirements also. Edward's perception of the situation can be explained in terms of external locus of control since he believes he is not the one in control of his actions. Similarly, events occurring in university reinforce

Edward's belief that he is not in control. If he should do well in a course he would consider it to be the result of luck or fate. On the other hand, if he should fail it might be attributed to such things as poor teaching, illness, or inappropriate textbooks.

The concept of locus of causality originated in cognitive and Gestalt theories. Locus of causality focuses on the mediation of outcomes by the intentionality of behavior. Using the example of Irene and Evelyn, Irene's actions while attending university reflect a desire to grow as an individual. She enjoys challenge and earnestly desires to learn and to experience the freedom available in initiating her own behavior. Irene's actions can be explained in terms of internal locus of causality since her interests and desires are the catalyst initiating her actions. On the other hand, Evelyn's actions, while attending university, are quite different. She has examined different professions, their pay and holiday benefits, and has decided to enter university as a means to a well-paying and prestigious job. Evelyn's actions, precipitated by future rewards, can be explained in terms of an external locus of causality since external events are determining her actions.

Locus of control emphasizes the consequence of a person's actions or the belief that the individual is the source of control. Locus of causality emphasizes personal causation or the belief that the individual is the source of the motivation underlying behavior. Rotter (1966) expresses the difference in approach between locus of control and locus of causality. He states:

> Reisman has been concerned with whether the individual is controlled from within or from without. We are concerned, however, not with this variable at all but only with the question of whether or not an individual believes that his own behavior, skills, or internal dispositions determine what reinforcements he receives (Rotter, 1966, p. 4).

The concern with whether the individual is controlled from within or from without is expressed in the concept of locus of causality. Individuals' perceptions that their own behaviors will determine the outcome of events is the approach of locus of control.

These two approaches are not interchangeable. De Charms (1981) records:

> Locus of control of reinforcements (Rotter) and locus of causality for behavior (Heider) are quite distinct concepts. They come from entirely different theoretical traditions. The first comes from social learning theory. The second comes from cognitive theory and bears traces of Gestalt theory. When locus of causality for behavior is shortened to personal causation and operationalized, it turns out not to be correlated with locus of control of reinforcements. Not only are the scores on the two measures not related, but the very ways in which the two concepts are measured are quite distinct and are based on entirely different assumptions about measurement (p. 338).

It is possible an individual may have internal and external differences with respect to locus of control and locus of causality. Ivan, in the earlier example, was described as demonstrating an internal locus of control by perceiving he had the ability to accomplish any work assigned to him at university. However, if he was attending university purely for a means to an end, the sake of a rewarding profession, he would possess an external locus of causality. Ivan would thus be described as personifying an individual with an internal locus of control as well as an external locus of causality. Edward, on the other hand, has an external locus of control believing his ability to do well at university results from luck or attendance at easy courses. If his attendance at university is based on the desire to acquire more knowledge, to learn for the sake of learning, Edward could be described as an individual with an external locus of control and an internal locus of causality. Similarly, Irene's motives for attending university may be described in terms of an internal locus of causality, motivated by the sheer enjoyment of learning. If she recognizes her strong academic abilities and attributes success to her natural ability and effort, Irene could be described as possessing an internal locus of control and an internal locus of causality.

In summary, locus of control and locus of causality form two distinct concepts (Koch, 1956; Pervin, 1975; Shaver, 1975). Behavior or action appears to originate from a source of control (locus of control) and a source of motivation (locus of causality). In research, it is imperative that a distinction be employed to differentiate which variable has been employed and that both approaches be examined. In utilizing this distinction an emphasis is placed on evaluating actions in terms of control (the perception of control of

outcomes) and motivation (the personal causation of an event).

B. Locus of Control

Locus of control concepts originated from attribution theory. Attribution theory with respect to locus of control emphasizes the source of control individuals arrive at when they examine their behavior and situation. Jones, Kanouse, Kelley, Nisbett, Valins, and Weiner (1972) describe attributions as the rules that the average person uses to infer cause and effect. The theory first assumes that people attempt to determine the causes of their own behavior. Second, it assumes that the assignment of causes to behavior occurs through a series of rules by which individuals arrive at a conclusion about their behavior. Third, attribution theory considers that the causes of particular behaviors will influence subsequent behaviors at both an emotional and non-emotional level.

Attribution theorists like Weiner, Heckhausen, Meyer, and Cook (1972) have introduced the concept of "stability" and "controllability" with locus of control in explaining behaviors. This divides internal causes and external causes into those that will remain fixed and those that will be variable (see Table 1). The fixed factors, ability and task difficulty, and the variable factors, effort and luck, direct an individual's involvement or non-involvement in an activity. These variables also influence an individual's persistence on a task despite failure. Ability and task difficulty do not tend to change substantially over time. Effort and luck tend to fluctuate from moment to moment.

Table 1

Weiner's Locus of Control

Stability	Internal	External
Fixed	Ability	Task Difficulty
Variable	Effort	Luck

Adapted from Weiner (1972) Table 6.1, p. 356

Inherent in Weiner's et al. (1972) approach is the concept that personal perceptions are formed in relation to the performance of other people. Past successes lead to the conclusion on the part of subjects that they have abilities in certain areas. Past failures lead to the conclusion of reduced beliefs in abilities. Individuals who succeed at a task where others have failed, perceive themselves as capable, able persons. If an individual succeeds at a task after expending a high degree of effort, effort becomes associated with a successful outcome. Effort and ability are thus regarded as internal characteristics working toward a goal that is variable in character. Conversely, situational factors occur when the individual judges the task to be easy or difficult depending on another's success or failure and when luck is assumed to be involved in a task. Luck is the perception that the individual has no control over the outcome of the task. Attributions perceived to explain the reasons for success and failure influence future expectancies of success and achievement behavior. For example, if success is attributed to ability then there will be increased expectancy of success in the future. If success is attributed to luck then there will be little change in expectation of success in the future.

Rotter (1954), utilizing a cognitive locus of control approach, emphasized the concept of a freedom of movement (control) and need value (motivational drive) as a consequence of the activity. Rotter's (1972) general formula states that the potential occurrence of a set of behaviors that lead to the satisfaction of a need potential (NP) is a function of two factors. The first factor is the expectancy that these behaviors will lead to reinforcements or freedom of movement (FM). The second factor is the strength or value of these reinforcements or need value (NV). Therefore, NP = f(FM + NV). The perceived freedom of movement constitutes the concept of locus of control. Rotter (1954) defines freedom of movement to be

> the mean expectancy of obtaining positive satisfactions as a result of a set of related behaviors directed toward the accomplishment of a group of functionally related reinforcements. A person's freedom of movement is low if he has a high expectancy of failure or punishment as a result of the behaviors with which he tries to obtain the reinforcements that constitute a

particular need (p. 194).

Internal control occurs when events, whether positive or negative, are viewed as a consequence of an individual's own actions. External control refers to the perception that events, whether positive or negative, are not related to the individual's own behavior and are, therefore, outside their control.

In a study conducted by Glass et al. (1969), the effects of perceived freedom of movement (locus of control) were examined. Individuals were randomly assigned to groups to perform a number of insoluble puzzles and to proofread a seven-page essay. Both groups were subjected to loud and randomly occurring noise. The only difference between the groups was that one group was provided with a button that enabled them to terminate the distractions. They were encouraged to use the button only if the noise became unbearable. Subjects in the group with a perceived control of the distractions, an off switch, performed significantly better on the proofreading task and tried almost five times the number of insoluble puzzles. Since none of the subjects with buttons actually utilized them, it would appear that the knowledge that the individual has control over a situation assists in overcoming the effects of distracting stimuli. Similar results were found in a variety of adverse situations where individuals perceived they had some control (Blechman & Dannemiller, 1976; Glass et al., 1971, 1973; Houston, 1972; Staub et al., 1971).

Overmier and Seligman (1967) studied two groups of dogs, one group that had received and one group that had not received inescapable shocks prior to an escape control situation. They then compared the latency of escape responses, the number of failures to escape shock, and the overall percentage of subjects that never escaped shock. They reported that:

> Not only do statistical differences appear between the performances of S's exposed to inescapable shock and those of unshocked S's during subsequent instrumental avoidance training 24 hours later, but large qualitative differences also appear. The phenomenon we have reported is dramatic to observe. Whenever a S, which was not treated with inescapable shock, first received shock in the course of instrumental training, it typically barked, yelped, ran and jumped until it escaped. An S previously exposed to inescapable shock initially reacted to the first shock during instrumental

> training in much the same way. In contrast, however, it soon typically stopped vocalizing and moving in an agitated fashion and would remain silent until shock terminated. On succeeding trials, S's would typically continue in a maladaptive pattern of behavior - not necessarily the same on each trial - and passively 'accept' the severe pulsating shock (Seligman et al., 1969, p. 30).

Overmier and Seligman (1967) attributed the differences in escape response to have arisen from the learned helplessness of the group which had experienced inescapable shock experiences.

Links to human behavior have been made by Abramson, Seligman, and Teasdale (1978) and Abramson, Garber, and Seligman (1980). Abramson et al. (1980) reported that when an outcome or reinforcement is important to an individual and there is a perceived lack of control over the activity a passive acceptance of aversive stimulation can manifest itself in people in the form of learned helplessness. Baum, Aiello, and Calesnick (1978) extended the concept of perceived control to examine the association of perceived control with learned helplessness among college students residing in variously designed dormitory arrangements.

Similar to the concept of learned helplessness is the connection between powerlessness and the acquisition of information. Seeman and Evans (1962) linked locus of control to the cognitive activity of information assimilation. Using a twelve item measure of powerlessness derived from Rotter's I-E scale, they found the correlation between powerlessness and knowledge to be $r = .31$, $p < .01$. Seeman and Evans discovered that internally oriented tubercular patients obtained significantly more information about the disease than externally oriented patients. Seeman (1963) concluded that individuals' senses of powerlessness, as measured through the locus of control, govern their attention and knowledge acquisition processes.

Crandall, Katkovsky, and Preston (1962) initiated investigation of locus of control with achievement-related variables. Children were observed during a week's day camp on play activity. Two categories of play material were provided, general play materials and intellectual achievement materials. Materials in the intellectual achievement category

included such items as books focusing on knowledge acquisition, thinking skill games such as checkers and form-boards, and intellectual quiz games such as flash cards. The child's play activity was observed, and the amount of time spent on intellectual activities over time and the degree of concentration on these activities was recorded. Concentration was measured on a Likert scale based on personal achievement standards. Free-play activities were included as one of the achievement measures along with the Stanford-Binet Intelligence Test and the California Achievement Tests. Predictor measures included a TAT measure of need for achievement, a manifest anxiety scale, a personal statement on concern for intellectual attainment, intellectual success and intellectual achievement standards, and the Intellectual Achievement Responsibility Questionnaire (IAR). The IAR measures locus of control in relation to an individual's beliefs regarding responsibility for outcomes in academic situations. The test consists of 34 items for which the student checks one of two answers indicating either an internal locus of control or an external of control. The strongest correlation of all measures related to time spent in intellectual free-play activities and degree of concentration, was found in the IAR for boys with a $r = .70$, $p < .05$ and $r = .66$, $p < .05$ respectively.

Although Crandall, Katkovsky, and Preston (1962) did not find a significant correlation for girls, Chance (1965) replicated the experimental conditions among third, fourth, and fifth grade subjects and found a significant correlation for girls between the intellectual free-play activities and the IAR at the $p < .01$ level with $r = .34, .45, .51$ respectively . Crandall, Katkovsky, and Crandall (1965) further investigated the relationship of the IAR with the Iowa Test of Basic Skills and report card grades among third, fourth, and fifth grade boys and girls and found significant correlations between the IAR and reading, math, language, and total achievement.

McGhee and Crandall (1968) investigated the relationship between locus of control, as measured by the Intellectual Achievement Responsiblity Questionnaire (IAR), and academic achievement, as measured by the Iowa Achievement Test and school grades.

They found a significant positive correlation between both internal locus of control scores and high achievement test scores and between internal locus of control and high grades.

Messer (1972), replicating the McGhee and Crandall (1968) study, also addressed the question of the relationship between internal locus of control and academic achievement as measured by grades and standardized achievement tests. Messer's (1972) subjects consisted of 39 fourth-grade boys and 39 fourth-grade girls from a local public school. Each child was individually administered the Intellectual Achievement Responsibility Questionnaire (IAR). Scores on the IAR were coded to place subjects in high, medium, or low internal groupings. Results for each student were compared with IQ obtained from a recent Lorge-Thorndike score, achievement from the Stanford Achievement Test, and grade point averages from the student's third grade. It was found that higher internally oriented subjects received higher grades.

Although McGhee and Crandall (1968) found a significant positive correlation between achievement scores and locus of control, Messer (1972) found no significant correlation between Stanford Achievement Test scores and internal locus of control. Both Messer (1972) and McGhee and Crandall (1968) noted that internal locus of control appears to be a better predictor of grades than standardized achievement scores. Messer (1972) concluded that individuals who achieve well or have a higher intelligence are more likely to have or to develop a feeling of being in control. Messer (1972) also found a high correlation between grades and achievement test scores when cognitive impulsivity (comparing the mean response time for the first ten items with response time for the remainder of items) and IQ were controlled. Messer (1972) further found that boys who assumed responsibility for success and girls who assumed responsibility for failure were the group most likely to have obtained high grades and achievement scores. These studies indicate a significant correlation between locus of control and academic behaviors, in particular, the higher the internal locus of control, the greater the scores on grades and achievement tests.

Further studies of locus of control and achievement were carried out by Lessing (1969) and Harrison (1968). Lessing (1969) studied locus of control and achievement of eighth and eleventh grade students from Chicago schools. There was a high correlation between locus of control as measured by Strodtbeck's Personal Control Scale and grade point averages. When IQ scores were used as a covariate and partialled out, locus of control continued to be highly correlated with scholastic achievement. Harrison (1968) in a similar design examining socioeconomic status and success in school using Harrison's View of the Environment Test to measure internal locus of control found significant positive correlations between locus of control and academic success.

Bar-Tal and Bar-Zohar (1977) conducted a critique of studies examining locus of control with academic achievement. Of the thirty-six studies presented, thirty-one reported positive relationships between locus of control and achievement, three reported no significance, and only two studies Katz (1967) and Stephens (1973) reported a negative finding. These two studies examined a limited sample of college students, females in a psychology course, using grades and locus of control from the Rotter's I-E scale.

Although the majority of research supports a relationship between locus of control and academic behavior, studies are still finding conflicting results. Gadzella, Williamson, and Ginther (1985) in examining adults in a university environment found no significant correlation between achievement and locus of control. They administered Levenson's Internal, Powerful Others, and Chance Locus of Control Scale questionnaire to 129 undergraduate volunteers at a southwestern state university. The group had an equal representation of men to women. Correlation of subjects' grade point averages with scores on the Locus of Control Scales, unlike the studies of Messer (1972), Lessing (1969) and Harrison (1968), revealed no significant correlations. Locus of control for both men and women did not appear to be directly related to academic behavior.

Although there is a strong indication that locus of control correlates with achievement behaviors there are discrepant findings and research is now shifting focus to

answer the question of when, under what conditions, and with what populations the locus of control concepts correlate with achievement. For example, classroom environmental differences such as "open" versus "traditional" settings when comparing locus of control and achievement have been investigated by Arlin (1975) and Wright and DuCette (1976). The "open" school environment recorded a higher predictive value between locus of control and academic achievement than did the "traditional" environment. Studies have also been conducted by Harpin and Sandler (1979) and Harpin (1980) examining teacher control and internal locus of control with achievement. Students were able to predict their success in school dependent upon the structure of the classroom.

On other factors associated with success in academic environments, internal locus of control subjects performed better than externally controlled subjects. Sherman, Pelletier, and Ryckman (1973) found internal locus of control individuals to be less dogmatic as measured by the Rokeach scales. Brecher and Denmark (1969) examined verbal fluency and reported that internal locus of control individuals exercised greater verbal abilities. An ability to discern accurate judgements from material that was not complete was found to be significantly better with internal locus of control students (DuCette & Wolk, 1973; Williams & Stack 1972). Ludwigsen and Rollins (1971) observed that internal locus of control students performed significantly better than externals on tasks that involved the recognition of random forms. Research appears to support the idea that the internal locus of control individual has a better ability to acquire and interpret information and to adapt to various activities and environments.

In summary, locus of control, originating from attribution theory, examines the source of the control individuals believe they possess when assessing a situation. Internal locus of control individuals attribute the outcomes of their actions to ability or effort, whereas external locus of control individuals attribute outcomes to task difficulty or luck. Although a positive relationship appears to exist between internal locus of control and achievement, a number of inconsistencies in findings have been reported.

C. Locus of Causality

The locus of causality concept originated in studies on personal causation, where individuals are perceived to be in ownership of their actions. This concept was influenced by Gestalt principles of perceptual organization with an emphasis on the intentionality of individuals to mediate the outcomes of their actions. The concept of locus of causality was developed by de Charms (1968) and predicated on the assumption that individuals desire control of certain situations for the sake of mastery rather than for the consequences of the activity. De Charms (1968) believed that individuals can be categorized as either "origins" or "pawns." "Origins" are persons who experience locus of causality for behavior as internal to themselves whereas "pawns" are individuals whose behavior is regulated by external forces. The regulation of behavior from within or without, that is, as causal agents in the environment, leads to internal and external motivational concepts respectively.

The contrast between internal and external motivation in the locus of causality concepts is described by Calder and Staw (1975) as originating from a need to feel a sense of personal causation in actions. Individuals who can readily assimilate information about themselves are said to have an internal locus of causality. In this manner, locus of causality is related to cognitive activity. Individuals with strong internal causality expectancies would be expected to be more calculating and cautious about options and involvement in activities than would those with strong external causality. Utilization of a greater degree of cognitive information processing and strategies would diminish the extent to which internal locus of causality individuals would feel like pawns of fate dominated by events in the environment.

Locus of causality was developed as a content-consequence situation by Kruglanski, Riten, Amitai, Margolin, Shabtai, and Zaksh (1975). They stated that individuals have an internal locus of causality when they attribute the cause of their activity to the content of the task, while those with an external locus of causality would attribute the

consequence of the task to be the cause for behavior. The content-consequence approach views internal causality not as a control or a lack of control of the environment but rather as a type of motive for behavior. It is based on a differentiation between means and ends.

Means and ends are examined with regard to individuals' self-perceptions of activities as being positive, negative, or neutral (Lepper & Greene, 1976). An individual with an internal locus of causality views the end of an activity as negative or neutral while the means are perceived as positive. An individual is considered to have an external locus of causality when the ends of an activity are perceived as positive while the means are perceived as negative or neutral.

Internal causality is described by Deci (1971) as activity that is performed for no apparent reward except for the satisfaction of doing the activity in and of itself, while external causality refers to behavior due to factors within the environment. Internal causality is considered to provide individuals with feelings of competence, with the perceived ability to deal with the environment, as well as self-determination, and with the perceived ability to control interactions between themselves and their environment (Bandura, 1977; Deci, 1975; Hunt, 1965; White, 1959). Feelings of competence and self-determination motivate individuals with internal locus of causality as they engage in situations that provide some form of challenge and then attempt to conquer the challenge through the use of their abilities. According to Deci (1975) the "need for feeling competent and self-determining motivates two kinds of behavior, behavior which seeks optimal challenge and behavior which conquers challenge (p. 53)". The type of behavior that seeks and conquers challenges for the sake of the activity alone would be characteristic of the individual with an internal locus of causality.

The research by McClelland, Atkinson, Clark, and Lowell (1953) on motivation focused attention on examining the nature of tasks and the experience of the participant in activities that are considered enjoyable. Locus of causality resulting from tasks that are enjoyable for their own sake has been termed as autotelic activities by Csikszentmihalyi

(1975). He defines "autotelic" activities as those which "required formal and extensive energy output on the part of the actor, yet provided few if any conventional rewards (p. 10)". Csikszentmihalyi presents this concept in a model of the flow experience.

Contained in this model are six elements. The most primary element is a merger of action and awareness. In this state individuals are aware of their actions within the activity but do not stop to question their actions. The merger of action and awareness is accomplished by the five other leading elements. First, the individual's abilities must equal the situations or challenges of the task. Second, the individual must be able to focus attention directly on the activity at hand. Third, the individual experiences a loss of ego while engaged in the task experience. This loss of ego is manifested by an involvement where the sense of time and space is unnoticed. Fourth, the individual unconsciously demonstrates a sense of causality over actions and environment. Finally, the person seeks action and feedback while being engrossed in the task. Csikszentmihalyi notes that the key to achieving a flow state experience is to achieve a merger of action and awareness.

When dealing with children, Anderson and Moore (1960) warned that autotelic activities require the addition of two more elements. First, the activity must be relevant to children and their continued development. Second, the activity must be engaged in an environment in which the child feels at liberty to make mistakes while learning. In order to attain these two elements, children must be in a position where they are working toward achieving some type of goal they deem valuable and be attaining satisfying results from their learning. Due to the difficulty in measuring motives for behavior, studies on locus of causality are not as clearly defined as those on locus of control. Research on locus of causality has focused on reward and task commitment to evaluate internal and external causality. Of particular concern to this present research is the influence of locus of causality on academic demands.

If individuals have learned to pursue goals through their own desires then they are more likely to succeed in school related tasks. School demands require that students

remain attentive and able to persist at activities such as reading and math problems. Delayed gratification is required as the activity at hand may not prove to be rewarding until a future date. Tasks are often laborious and repetitive involving suppression of pleasurable activities for those of self-management and conscious, sacrificial effort. Studies have indicated that locus of causality is related to the degree an individual will become involved in the pursuit of achievement. For example, Clifford and Cleary (1972) examined the relationship between grade four, five, and six students' academic performance and achievement accountability. Ninety-nine subjects from grades four to six in Marshalltown, Iowa, were involved in the study. Mean IQs of the sample recorded from a variety of previously administered tests obtained from school files were 110.9 with a standard deviation of 14.9. Proportion of males to females was reported to be approximately equal. Academic performance was measured by using an adapted question form examining spelling, vocabulary, and math obtained from standardized achievement tests. Locus of causality was tested through an Academic Achievement Accountability Questionnaire (AAA). The AAA questionnaire was estimated to have reliability correlations of .66 and .67 with fifth and sixth grade subjects.

For each of the three grades, internal locus of causality showed significant positive correlations with performance. With males, the relationship between internal locus of causality and performance was stronger than that found with females. Female IQ correlated more highly with performance than with internal locus of causality.

The effect of rewards on locus of causality is of direct interest since individuals with an internal locus of causality are perceived as operating from internal rewards such as mastery and interest while individuals with an external locus of causality operate from external rewards. Ross, Karniol, and Rothstein, (1976) reported that, when rewards are contingent on successful performance, the anticipation of the reward serves as a cue to the success of the performance and task competence. The cue acting as a reinforcement, in turn, is predicted to decrease subsequent internal motivation (Lepper, Greene, & Nisbett,

1973).

Ross (1975) reported that rewards need to be salient (appropriate for the individual) in order to decrease work performance with individuals possessing internal locus of causality. If a task is a no-fail situation with amount of reward contingent upon the number of responses, individuals with internal locus of causality are expected to decrease in performance whereas external individuals are expected to maintain or increase performance (Ross, Karniol, & Rothstein, 1976). The individual with an internal locus of causality is believed to be distracted by the reward whereas individuals with an external locus of causality increase interest (Baron and Ganz, 1972). The shift in focus from performing activities for challenge to performing tasks for reward decreases internal locus of causality and performance. Conversely, with reward, the motivation of an externally oriented individual is increased and performance is also reported to increase. Support for such results was found by Baron and Ganz, (1972) with external rewards administered to children previously ranked as possessing internal or external locus of causality based on task commitment. They reported that externally oriented children increased work output with external rewards whereas internal rewards increased performance of children with high internal locus of causality.

In summary, locus of causality, originating from cognitive theory, refers to the source of motivation of individuals. Individuals with an internal locus of causality are motivated by the need to feel a sense of personal causation for their actions, whereas individuals with an external locus of causality are motivated by the ensuing reward. Although a positive relationship is expected to exist between internal locus of causality and achievement, the number of studies investigating this relationship in limited.

D. Giftedness and Underachievement

Of concern to this study is the generalizability of the concepts of locus of control and locus of causality with underachieving and achieving gifted populations. The number

of studies that have focused on locus of control with gifted populations is very limited in scope. Research on locus of causality with gifted populations is virtually nonexistent and there is a similar paucity of research investigating locus of control and locus of causality with underachieving and achieving populations. Do gifted students with various academic behaviors, but the same potential as assessed by IQ, demonstrate significantly different patterns in locus of control and locus of causality?

The following is a selective review of empirical studies that have investigated various aspects of achievement and locus of control with gifted populations. These studies are of particular relevance to the present research and are presented in greater detail, especially the studies by Kanoy, Johnson, and Kanoy (1980) and Davis and Connell (1985) which have arrived at different results.

Kanoy, Johnson, and Kanoy (1980) investigated locus of control with achieving and underachieving bright elementary students. Fourth-grade students from the Burlington, North Carolina, public school system were selected based on IQ and achievement scores. IQ scores were measured on the Cognitive Abilities Test (CAT) with the criteria for giftedness being one standard deviation above the mean (IQ >116). The IQ score and student's grade point average (GPA) in arithmetic, reading, and language from grade three were incorporated into a regression line equation to predict the GPA for grade four. Actual grade four GPA was subtracted from the predicted value to arrive at a discrepancy score. Subjects were selected on the extreme ends of the discrepancy scores to attempt to ensure inclusion of underachievers and achievers. Since discrepancy scores were generally negatively skewed toward achievers, the top 50% of the discrepancy scores were designated as achievers and the bottom 20% were considered underachievers. Of 63 students considered academically gifted (IQ >116 on CAT) in the fourth grade, 46 were within the guidelines of the criteria for underachievement and achievement. Of these 13 students refused permission for testing and four students moved out of the district. The final sample consisted of 20 achievers and 9 underachievers.

Subjects were administered the Intellectual Achievement Responsibility Questionnaire (IAR) and scored on the basis of their total internal locus of control, negative internal control, and positive internal control. Negative internal control refers to the individual accepting responsibility for failing at an academic activity, whereas positive internal control refers to the acceptance of responsibility for academic success. Data were analyzed using a single-factor analysis of variance of unweighted means. Findings indicated that achievers had significantly higher internal locus of control [$F(1,25) = 7.23$, $p<.05$] than underachievers. Achievers also scored significantly higher [$F(1,25) = 6.01$, $p < .05$] than underachievers on negative internal control. There were no significant interaction effects or differences between achievement groups on the IAR positive internal control score. Analysis of gender also failed to reveal any significant differences. Results lend support to previous findings by Messer (1972) that locus of control theories appear related to academic achievement.

In a study of the effects of aptitude and achievement behavior on self-perceptions, Davis and Connell (1985) examined four groups of subjects drawn from grades four, five, and six of two school districts in a northeast American metropolitan area. Six schools participated in the study with all students in grades three through six considered eligible to participate. With only 55% of the parents agreeing to have students tested, the final sample was comprised of 172 students. Subjects were placed into four groups based on a regression analysis using IQ from the Otis Lennon Mental Ability Test as a predictor of achievement. Actual achievement was measured by either the Stanford Achievement Test or the Metropolitan Achievement Test. The gifted underachiever group was defined as having IQs of greater than 125 and achievement scores one standard error below their predicted achievement scores. The gifted achievers had the same criteria for IQ but the standard error of prediction of their achievement scores was within .5 standard errors of their predicted achievement scores. The gifted underachievers group comprised 15 of the total subjects having a mean IQ of 134. Gifted achievers comprised 38 of the total sample

with a mean IQ equal to 136. The average underachiever group had IQ within .5 standard deviations of the mean IQ of the larger sample and were at least one standard error below their predicted achievement score. Average achievers had the same criteria as the average underachievers for IQ but achievement was within .5 standard errors of their predicted achievement score. The mean IQ for average underachievers was 107 with 16 subjects in this group while the average achievers had an IQ mean of 103 and comprised 56 of the total subjects.

The Multidimensional Measure of Children's Perceptions of Control (Cornell, in press) was used to examine internal locus of control. A univariate analysis of variance found significant differences between achievers and underachievers on internal locus of control to be in the opposite direction to that predicted from the literature. Underachievers were significantly higher on internal locus of control than achievers. On the subtest examining Powerful Others Control, underachievers scored significantly lower than achievers again indicating that underachievers are willing to take responsibility for their learning outcomes and not attribute success or failure to the control of "powerful others." It would appear that underachieving subjects recognize that they and not factors such as the teacher are responsible for their achievement behavior (Davis & Connell, 1985). Underachieving subjects appear to recognize that not achieving to potential is due to a lack of effort. In this manner, the underachieving gifted may be closer to Newman's (1973) concept of "He can, but He Won't."

Research on the gifted with respect to locus of control indicates that the gifted population as a whole tends to have significantly higher internal control than average students (Fincham & Barling, 1978). In a psycho-educational study of 1,593 gifted high school students in a large metropolitan urban California school district, Tidwell (1980) examined locus of control as one of six factors in the total profile of gifted students. The purpose of the study was to provide a wide range of characteristics about gifted students. The sample consisted of 804 males and 789 females from the tenth grade. Represented

were 46 high schools and four racial groups. Gifted subjects were considered to be individuals within the top 2% of all students at a comparable grade level or who had been identified as having a high intellectual capacity but having difficulty scholastically due to cultural disadvantages.

A 16-item instrument Locus of Control questionnaire developed by the Teacher Development Division of the Far West Regional Laboratory for Educational Research and Development, California, was used to measure internal control. The internal consistency reliability coefficient was reported to be .64. From the analysis of all gifted subjects investigated in the research project, gifted individuals exhibited a great degree of similarity in response to the locus of control questionnaire. The mean internal score of 11.37 as compared with the mean external locus of control score of 4.43 was significantly different to indicate that gifted subjects have a high internal locus of control. Gifted subjects considered themselves to be in control of their own lives and the events that influenced them.

As there are few studies linking giftedness and underachievement with locus of control or locus of causality, the relationships among these factors remain largely theoretical and require the application of research for clarification. It may be possible to unravel the anomalous "underachieving gifted" puzzle through the examination of these factors.

E. Summary

Locus of control, which focuses on the degree to which individuals believe themselves to be in control of their actions, and locus of causality, which examines the motivation for choosing one's actions, appear to contribute to achievement behavior. Although some studies have indicated that internal locus of control has a direct effect on academic achievement, a perfect predictive correlation has not been found. Insufficient research is available to determine the relationship between locus of causality and

achievement. To further complicate the matter, the ability to generalize research on locus of control and locus of causality to specific population groups in specific situations is not as broad as was once thought possible. Therefore, the findings from research done with average students may not be applicable to gifted students. It is also entirely conceivable that research findings on particular age groups may not be transferable to other age groups.

Although much of what has been already done may not be transferable, the previous research does provide a basis from which to proceed. Both the definitions used in selecting achievers and underachievers and the differences in the grades selected may result in internal locus of control variations. Gifted achievers and underachievers would be expected, based on previous research, to be significantly different on internal control at younger grades. As a whole, gifted students would also be expected to have higher internal locus of control scores than the general population. Age, development, and maturity may contribute to an increase in internal locus of control, and therefore, differences in internal locus of control between gifted underachievers and achievers may not remain significant over time.

In assessing locus of causality, the administration of an autotelic activity which is at the developmental level of the subjects and is non-threatening can be used to obtain a basal level of potential occurrence of a set of behaviors in achievers and underachievers. The introduction of an external reward to an intrinsically rewarding task, contingent on performance but still within a no fail, non-threatening environment might create a shift in behavior toward increased performance for individuals with external locus of causality and decrease behavior, due to interference, for the internally, self-determined individuals. Differences noted between the basal response and the response with external reward should give an indication of the degree to which individuals have an internal or external locus of causality.

On the basis of the information gained in previous research, this study will explore the relationships between underachieving and achieving gifted students, locus of control

and locus of causality. Perhaps through persistent research efforts some sense will emerge from the confusion that presently surrounds these concepts as they relate to achievement among specific populations.

F. Definitions of Terms

The purpose of this research is to investigate the relationship between locus of control and locus of causality and underachieving and achieving gifted students. Since the terms locus of control, locus of causality, underachieving gifted, and achieving gifted are used extensively, clear definition of these terms is warranted.

Locus of control examines the individual's beliefs that outcomes are contingent upon one's behavior. Research on locus of control originated in social learning theories where behaviors are considered controlled by expectancies of reinforcement. The focus of locus of control is on the "who" or "what" that is believed to control an individual's actions. Thus the critical question for locus of control is: "What is controlling an individual's outcomes?" Internal and external control is perceived to lie with the individual's beliefs about the relationship between behavior and outcomes (Rotter, 1966). Internal control is attained when reinforcements are achievable by performing the required contingencies. Behavior is governed by ability or effort. Conversely, external control occurs when reinforcements are not attainable by performing the required contingencies but are delivered by fate or luck.

In this research, locus of control is defined in terms of scores attained on Crandall's Intellectual Achievement Responsibility Questionnaire (IAR). The IAR measures internal and external locus of control by examining a child's beliefs regarding responsibility for outcomes in academic achievement situations.

Locus of causality examines the factors that regulate and initiate behavior. Behavior is analyzed from a motivational perspective, investigating the factors that relate to self-determination. Self-determination is the experience of freedom in initiating one's own

behavior. Individuals are said to have an internally perceived locus of causality when they perform an activity for internal rewards such as interest or skill development. Individuals are said to have an externally perceived locus of causality when they become involved in an activity predominantly for an external reward or constraint. The activity is perceived as a means to an end rather than an end in itself (Deci & Ryan, 1985). The critical question with locus of causality is: "Why do persons behave as they do?"

In this research, two Unusual Uses Tasks are presented to students to assess locus of causality. The first task is presented with no external reward. In the second comparable task, students are offered a task-contingent reward. Both tasks are such that all children should be able to complete the demands of the activities. Differences in the number of responses between the first task (no reward) and the second task (reward) indicate influences resulting from external reinforcement.

Underachieving gifted definitions, although varying extensively, agree on the inclusion of a discrepancy between potential and actual academic performance. Clark (1979) considered the gifted underachieving child to be "someone who has shown exceptional performance on a measure of intelligence and who, nevertheless, does not perform as well as expected for students of the same age on school related tasks" (p. 279). Similarly, Gallagher (1979) defined underachievement in gifted students as those with either a gap between achievement test scores and intelligence test scores or a gap between academic grades and intelligence test scores.

In this research, underachieving gifted is defined in terms of both achievement criteria and gifted criteria. Underachieving gifted students are those Grade 6, 7, 8, and 9 students in the Edmonton Catholic School System with total discrepancy scores one and one-half standard deviations below the mean total discrepancy score as measured by a multivariate technique of multiple regression, and who score at least 115 on all of the Verbal, Non-Verbal, and Full scales, or at least 130 on either the Verbal or Non-Verbal scale with a Full scale score of 120 or greater, as measured by the Canadian Lorge-

Thorndike Intelligence Test.

Achieving gifted are generally defined in the literature under the umbrella category of gifted. In the general sense, the achieving gifted are those gifted individuals who are achieving at a level commensurate with their intellectual ability.

In this research, achieving gifted students are those Grade 6, 7, 8, and 9 students in the Edmonton Catholic School System with total discrepancy scores one and one-half standard deviations above the mean total discrepancy score as measured by a multivariate technique of multiple regression, and who score at least 115 on all of the Verbal, Non-Verbal, and Full scales, or at least 130 on either the Verbal or Non-Verbal scale with a Full scale score of 120 or greater, as measured by the Canadian Lorge-Thorndike Intelligence Test.

CHAPTER III

METHOD AND DESIGN

A. Subjects

The subjects for this study were drawn from a pool of students identified as gifted achievers or underachievers on the basis of the Canadian Test of Basic Skills and the Canadian Lorge-Thorndike Intelligence Test which had been administered to all students in the Edmonton Catholic School System at the end of the 1985-1986 school year. Screening for students was accomplished in two stages. Initial screening for a gifted group was achieved by selecting all students in grade six, seven, eight, and nine with a Full scale I.Q. of 115 and above (one standard deviation above the mean) as measured by the Canadian Lorge-Thorndike Intelligence Test. Two sets of criteria for scores on Verbal and Non-Verbal portions of the Lorge-Thorndike Intelligence Tests were established for the second stage of screening to ensure a group that would be representative of students above the norm on intelligence. The first set of criteria admitted all students with a Verbal, Non-Verbal, and Full scale I. Q. of at least 115. The second set of criteria added those students with a score of at least 130 on either the Verbal or Non-Verbal portion of the Lorge-Thorndike with a Full scale score of 120 or greater. These criteria assured that subjects were either above the norm on both the Verbal and Non-Verbal portions or were exceptionally high in one area of the Lorge-Thorndike Intelligence Tests.

In the second stage of screening, a measure of achievement was determined through the use of the Canadian Test of Basic Skills (C.T.B.S.). A multiple regression procedure incorporating Full Scale I.Q., age, and gender factors to predict expected achievement was calculated on all students in the school system. The strength of the relationship between each predictor was obtained by using all the students in the system in a particular grade. Each predictor variable was then assigned a weighting. The weights were then put into a

regression formula for each pupil to obtain an expected achievement level for that student. Expected achievement was subtracted from actual achievement to obtain a discrepancy score. From the pool of subjects chosen on the basis of intellectual and achievement parameters, the sample selected for this study consisted of all the students in grades six, seven, eight, and nine who met the criteria of giftedness and in addition were one and one-half standard deviations above (achievers) or below (underachievers) the mean of the gifted group with respect to the discrepancy score.

As selection of subjects was based on previous testing administered outside the realms of this research, subjects or school staff were informally asked, prior to the current testing, about situations which may have intervened during the previous testing to affect performance. Intervening variables such as recent emotional disturbances, language difficulty (ESL), and extended illness which may have resulted in temporary discrepant performance disqualified an individual as a subject for this study.

Defining Achievement and Underachievement with the Prediction Model

Discrepancy scores were obtained through a multiple regression analysis by grade calculated for all students in the Edmonton Catholic School System. This analysis was conducted prior to the commencement of this research. The multivariate technique of multiple regression was used to determine the correlation between criterion variables based on scores from each of the four subtests of the Canadian Test of Basic Skills (C.T.B.S.) and the predictor variables of Lorge-Thorndike Full Scale I.Q., gender, and chronological age measured in years. Coefficients of determination (R^2) and prediction equations were obtained for each of the four subtests (vocabulary, reading comprehension, math concepts, and math problem solving) for the Canadian Test of Basic Skills with respect to grades six, seven, eight, and nine. The prediction equation was used to calculate the expected score of each student for each of the four subtests. The equation was expressed as: $Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + C$ where Y was the scores being predicted from X_1, X_2, and X_3 (X_1,

individual student's I.Q.; X_2 gender; X_3 chronological age), β being the separate beta weights calculated for each predictor variable (based on total number of students) and C being a constant. Each student obtained four *Y* predicted scores, one for each of vocabulary, reading comprehension, math concepts, and math problem solving.

Students' I.Q., gender, and age were assumed to be good predictors of the criterion variable of achievement as measured by the Canadian Test of Basic Skills. Correlation between predictor variables was assumed to be low, therefore the same variance in the criterion variable was unlikely to be repeated. The assumption was made that the predictor variables correlated highly with the criterion variable.

Correlations between the predictor and the criterion variables were calculated through the SPSS-X statistical package. A multiple correlation coefficient (R) was then computed using the best predictor for first entry into the multiple regression equation in order to measure the magnitude of relationship between the criterion variable and predictor variables.

Tests for statistical significance to determine whether the obtained value of R was significantly different than zero or to determine whether the R^2 increment was statistically significant were not conducted. All predictor variables, whether significant or not were included in the predictive equation for obtaining the expected score on the respective subtests of the C.T.B.S..

Each student's score on the predictor variables was multiplied by the respective regression weights and then summed resulting in the best possible prediction of the student's score on the criterion variable. The predictive or expected score obtained on vocabulary, reading comprehension, math concepts, and math problem solving was subtracted from the student's actual score on the respective subtests to arrive at the discrepancy scores for each individual.

Discrepancy scores were then summed for each of the four subtests to arrive at a total discrepancy score. The mean and standard deviation of the total discrepancy score for

the students selected on the gifted criteria was calculated and all students lying one and one-half standard deviations from the mean were selected to represent the gifted achievers and underachievers. Mean and standard deviation results of the total discrepancy scores for all students (n = 3416) meeting the criteria of giftedness are represented in table 2.

Table 2

Means and Standard Deviations Across Grades for Total Discrepancy For All Gifted Students
(n = 3416)

	Grade Six		Grade Seven		Grade Eight		Grade Nine	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Total Discrepancy	-.582	2.116	-.793	2.508	.185	2.955	-.394	2.755

Students comprising the achieving gifted group were all of the subjects possessing an IQ within the operationally defined gifted range while also having a positive discrepancy score of one and one-half standard deviations from the gifted subjects' mean. The underachieving gifted group consisted of all subjects possessing an IQ within the operationally defined gifted range while also having a negative discrepancy score of one and one-half standard deviations from the gifted subjects' mean.

Criteria for selection of subjects based on I.Q., achievement discrepancy and grade resulted in 182 students eligible for testing. Reports from principals and teachers eliminated one student on the basis of English as a second language. No subjects were perceived as having recent emotional disturbances or extended illness. One subject was eliminated from the study due to a change of residence. Refusal to test at the request of parents eliminated one student. Eligible subjects attended forty-four schools throughout Edmonton and represented all major districts of the city. Permission was granted by principals for testing in forty-two schools. The two schools where permission was not granted eliminated fifteen students. As other schools tested were in the geographical areas of refusal and the subjects eliminated were relatively evenly spread out over grades six

through nine, subject biasing due to mortality is not felt to have entered into the subject selection.

The total number of subjects selected was 164 students of which 87 were underachievers and 77 were achievers. There were 91 males and 73 females. Gender differences among 45 male underachievers, 46 male achievers, 42 female underachievers and 31 female achievers were not found to be significant using χ^2 for two by two tables with $\chi^2_{obt.} = 1.0497$ ($\alpha > .05$, df. = 1). At each grade level the number of subjects was relatively even (see table 3).

Table 3

Breakdown of Subjects by Grade, Achievement, and Gender

	Grade Six		Grade Seven		Grade Eight		Grade Nine		Totals	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Underachiever:	9	14	13	13	7	12	16	3	45	42
Achiever:	10	6	13	7	13	10	10	8	46	31
Totals:	39		46		42		37		164	

There were 23, 26, 19, and 19 underachievers respectively in grades six, seven, eight, and nine. There were 16, 20, 23, and 18 achievers respectively in grades six, seven, eight, and nine.

Initial examination for significant differences between the underachieving and achieving gifted subject sample with regard to I.Q. as measured by the Canadian Lorge-Thorndike Intelligence Test was analyzed at each grade level with a one-way analysis of variance (ANOVA). To avoid the possibility of an observed difference on the dependent variable being due to between group differences on intellectual abilities, it was important to establish homogeneity between underachieving and achieving groups with respect to intelligence.

On the other hand, to differentiate the underachieving and achieving gifted groups, significant differences were desired between expected achievement and actual achievement as measured by the Canadian Test of Basic Skills. It was expected that there would be a

significant difference in discrepancy scores. This expectation was tested at each grade level using an one-way analysis of variance. Thus, while differences were sought on achievement criteria, similarity was desired on intelligence scores as measured by the Lorge-Thorndike Intelligence Test.

Analysis for Determining the Equivalence of Groups Based on the Canadian Lorge-Thorndike

An one-way analysis of variance was conducted to determine the between groups and within groups differences for each grade on the individual subtests of the Lorge-Thorndike Intelligence Test. The analysis was to determine whether the condition of homogeneity of intelligence was met.

Full Scale: One-way anovas revealed no significant differences between the underachieving and achieving gifted students on the Full scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = .993$, $p < .3405$], grade seven [$F(1,44) = 2.034$, $p < .1609$], grade eight [$F(1,40) = .002$, $p < .9615$], and grade nine [$F(1,35) = .976$, $p < .3299$] (see Table 4). The mean and standard deviation for both underachievers and achievers across grades were similar (see Table 5).

Table 4

One Factor Anova of Achievement Status on Lorge-Thorndike Full Scale

GRADE SIX					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	22.321	22.321	.933	.3405
Within groups	37	885.576	23.934		
Total	38	907.897			

GRADE SEVEN					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	66.582	66.582	2.034	.1609
Within groups	44	1440.396	32.736		
Total	45	1505.978			

GRADE EIGHT					
Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Between groups	1	.071	.071	.002	.9615
Within groups	40	1196.215	29.905		
Total	41	1196.286			

GRADE NINE					
Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Between groups	1	48.822	48.822	.976	.3299
Within groups	35	1750.421	50.012		
Total	36	1799.243			

Table 5

Lorge-Thorndike Full Scale Means, Standard Deviations, and Standard Errors Across Grades

	Grade Six	Grade Seven	Grade Eight	Grade Nine
Underachiever Means:	129.913	130.077	128.526	129.632
Std. Dev:	5.783	6.517	5.327	8.207
Std. Error:	1.206	1.278	1.222	1.883
Achiever Means:	128.375	127.650	128.609	127.333
Std. Dev:	3.160	.998	5.582	5.626
Std. Error:	.790	2.267	1.164	1.326

Verbal Scale: One-way anovas revealed a significant difference between the underachieving and achieving gifted students on the Verbal scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = 8.534$, $p < .0059$]. No significant differences between groups on the Verbal scale were noted for grade seven [$F(1,44) = 1.886$, $p < .1766$], grade eight [$F(1,40) = .029$, $p < .8652$], and grade nine [$F(1,35) = 2.955$, $p < .0945$] (see Table 6). As grade six revealed the only discrepancy found across the four grades for the intelligence comparisons, possible biasing in subject selection is expected to be minimal. Significant results at the grade six level may require interpretation in light of verbal differences. The mean and standard deviation for both underachievers and achievers across grades demonstrated slightly greater fluctuation than Full scale and Non-Verbal results. (see Table 7).

Table 6

One Factor Anova of Achievement Status on Lorge-Thorndike Verbal Scale

GRADE SIX					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	355.251	355.251	8.534	.0059
Within groups	37	1540.185	41.627		
Total	38	1895.436			

GRADE SEVEN					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	99.405	99.405	1.886	.1766
Within groups	44	2318.704	52.698		
Total	45	2408.109			

GRADE EIGHT					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	1.483	1.483	.029	.8652
Within groups	40	2033.588	50.84		
Total	41	2035.071			

GRADE NINE					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	181.863	181.863	2.955	.0945
Within groups	35	2154.137	61.547		
Total	36	2336.000			

Table 7

Lorge-Thorndike Verbal Means, Standard Deviations, and Standard Errors Across Grades

	Grade Six	**Grade Seven**	**Grade Eight**	**Grade Nine**
Underachiever Means:	128.261	128.615	125.579	125.158
Std. Dev:	7.599	8.290	7.081	9.518
Std. Error:	1.585	1.626	1.625	2.183
Achiever Means:	122.125	125.650	125.957	120.722
Std. Dev:	4.241	5.622	7.170	5.550
Std. Error:	1.060	1.257	1.495	1.308

Non-Verbal Scale: One-way anovas revealed no significant differences between the underachieving and achieving gifted students on the Non-Verbal scale I. Q. of the Lorge-Thorndike for grade six [$F(1,37) = 2.067$, $p < .1589$], grade seven [$F(1,44) = .64$, $p < .4279$], grade eight [$F(1,40) = .004$, $p < .948$], and grade nine [$F(1, 35) = .003$, $p <$

.9568] (see Table 8). The mean and standard deviation for both underachievers and achievers across grades were similar (see Table 9).

Table 8

One Factor Anova of Achievement Status on Lorge-Thorndike Non-Verbal Scale

GRADE SIX					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	77.699	77.699	2.067	.1589
Within groups	37	1390.609	37.584		
Total	38	1468.308			

GRADE SEVEN					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	41.973	41.973	.640	.4279
Within groups	44	2884.396	65.554		
Total	45	2926.370			

GRADE EIGHT					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	.375	.375	.004	.9480
Within groups	40	3487.744	87.194		
Total	41	3488.119			

GRADE NINE					
Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	.324	.324	.003	.9568
Within groups	35	3798.865	108.539		
Total	36	3799.189			

Table 9

Non-Verbal Means, Standard Deviations, and Standard Errors Across Grades

		Grade Six	Grade Seven	Grade Eight	Grade Nine
Underachiever	Means:	131.130	131.077	130.842	133.632
	Std. Dev:	6.427	8.428	11.349	11.122
	Std. Error:	1.340	1.653	2.604	2.551
Achiever	Means:	134.000	129.150	130.652	133.444
	Std. Dev:	5.669	7.638	7.290	9.618
	Std. Error:	1.417	1.708	1.520	2.267

Analysis for Determining Differences Between Groups Based on the Discrepancy Scores

As subjects were selected on the basis of discrepancy scores that were one and one-half standard deviations above (achievers) or below (underachievers) the mean of the gifted group, it was expected that significant differences between underachievers and achievers would be obtained on total discrepancy scores. Inspection of individual means and standard deviations of the four grade levels in Table 10 indicates this to be the case, and furthermore, one-way anovas revealed significant differences between underachieving and achieving gifted students on the total discrepancy score for grade six [$F(1,37) = 269.462$, $p < .0001$] grade seven [$F(1,44) = 234.735$, $p < .0001$], grade eight [$F(1,40) = 527.843$, $p < .0001$], and grade nine [$F(1,35) = 77.024$, $p < .0001$].

Table 10

One Factor Anova for Achievement Status and Total Discrepancy Score

GRADE SIX			
Achievement Status:	**Means:**	**Standard Deviation:**	**Standard Error:**
Underachiever	-4.426	1.575	.328
Achiever	2.669	.843	.211

Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	474.972	474.972	269.462	.0001
Within groups	37	65.219	1.763		
Total	38	540.191			

GRADE SEVEN			
Achievement Status:	**Means:**	**Standard Deviation:**	**Standard Error:**
Underachiever	-4.462	1.923	.377
Achiever	2.355	1.052	.235

Source:	**DF:**	**Sum Squares:**	**Mean Square:**	**F-test:**	**P value:**
Between groups	1	605.141	605.141	234.735	.0001
Within groups	44	113.431	2.578		
Total	45	718.572			

GRADE EIGHT			
Achievement Status:	Means:	Standard Deviation:	Standard Error:
Underachiever	-6.032	1.723	.395
Achiever	4.435	1.224	.255

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Between groups	1	1139.787	1139.787	527.843	.0001
Within groups	40	86.373	2.159		
Total	41	1226.16			

GRADE NINE			
Achievement Status:	Means:	Standard Deviation:	Standard Error:
Underachiever	-5.374	3.647	.837
Achiever	2.344	.795	.187

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Between groups	1	550.615	550.615	77.024	.0001
Within groups	35	250.201	7.149		
Total	36	800.817			

Summary

The analysis of achieving and underachieving students reveals that intelligence as measured by the Lorge-Thorndike does not differ significantly between the two groups or across grades except for verbal scores at the grade six level. However, there is a significant difference in total discrepancy scores between underachievers and achievers. Thus, the sample selected appears to meet the necessary criteria of being similar in intellectual potential but significantly different in achievement.

B. Screening Instruments

Initial selection of students was based on the Lorge-Thorndike Test for aptitude and the Canadian Test of Basic Skills for achievement administered to all students at the end of the 1985-1986 school year. These tests were administered by the individual classroom teachers in the Edmonton Catholic School System. Since these tests are simple to

administer and the scoring is a standard procedure, results are expected to be relatively consistent within and between classrooms.

Canadian Lorge-Thorndike Intelligence Test

The Canadian Lorge-Thorndike Intelligence Test has been widely used in schools as a measure of scholastic aptitude and verbal ability. The Lorge Thorndike Verbal battery has separate sub-tests for vocabulary, arithmetical reasoning, verbal classification and sentence completion. On the Non-Verbal battery, the sub-tests examine figure classification, number series and figure analogies. Both batteries are highly correlated and have good split-half reliability (see Table 11):

Table 11

Odd-Even Reliability of the Lorge-Thorndike Intelligence Test

		Verbal Battery			Non-Verbal Battery			
Grade	N	Mean	S.D.	r_{11}	Mean	S. D.	r_{11}	Correlation
5	550	49.76	13.85	.915	41.38	12.70	.920	.659
6	568	49.79	13.12	.911	39.65	13.44	.911	.612
7	598	46.78	11.29	.872	40.64	12.07	.908	.605
8	559	45.33	10.32	.830	37.81	10.76	.897	.558
9	575	51.52	11.42	.867	42.00	10.43	.894	.613

Thorndike (1963)
p. 29

Both the Verbal and Non-Verbal portions of the Lorge-Thorndike are correlated with achievement tests (r = .58 to .87) and school grades (r = .52 to .76).

The Lorge-Thorndike purports to have a limited validity for comparing aptitude with level of achievement. The type of ability measured on the Lorge-Thorndike is limited, with the authors claiming that both Verbal and Non-Verbal batteries are "avowedly measures of abstract intelligence - expressed in verbal symbols in the one case and in pictorial, diagrammatic, and numerical symbols in the other". (Thorndike, 1963, p. 14) Unfortunately there is relatively little information on validity studies of the Lorge-

Thorndike with the majority of reporting being on reliability. In the Preliminary Technical Summary, using Kuder-Richardson (20) reliabilities, it was reported that for the Verbal battery the KR 20s are in the Mid.-.90s at grade levels 3-12 and for the Non-Verbal battery they are in the .92 to .94 range. Stability coefficients over a six-month period are .93 in grades 6 through 9 on the Verbal battery and .89 in grade 7 on the Non-Verbal battery. The reliability values appear to be satisfactory for a group administered intelligence test.

Canadian Test of Basic Skills

The Canadian Test of Basic Skills (CTBS) measures generalized educational achievement in the development of basic skills in the areas of vocabulary, reading, language, work-study knowledge, and mathematics. Reliability coefficients published in the administrator's manual report scores ranging from .64 to .93. These results, representing moderate to high levels of internal consistency, are acceptable values for this type of achievement test. Although validity results are available for the Cardston, Alberta school district showing moderate to high correlations of .53 to .76 between CTBS subtest scores and year-end course grades for students in the ninth grade, validity of the tests for particular groups and purposes are left to be determined by informed judgement. The CTBS was derived from the Iowa Test of Basic Skills (ITBS), a test with a sound reputation in American schools. Modifications to the ITBS are reflected in norms based on a national Canadian sample and the utilization of Canadian content. Thus the Canadian Test of Basic Skills has merit in predicting school academic performance.

C. Test Instruments

Measurement of the dependent variables was obtained through the use of Crandall's Intellectual Achievement Responsibility Questionnaire for locus of control, and an Unusual Uses Task adapted from the Torrance Test of Creative Thinking for locus of causality.

Intellectual Achievement Responsibility Questionnaire

Crandall, Katkovsky, and Crandall (1965) developed the Intellectual Achievement Responsibility Questionnaire (IAR) to address the need for assessment of internal/external locus of control. In the development of the assessment technique, three orientations were desired. First, the test was to be primarily a measure of locus of control as it relates to achievement across subject areas. Second, a focus on those perceived to be significant others such as teachers, peers, and parents was to be used as a source of external control. As such the IAR is suited for use with school-aged children. Finally, separate measures for internal control were devised to provide scores for a subject's response to situations involving success as well as failure. Thus, the IAR is generalizable across academic areas, examines specific agents of external control, and investigates two types of internal control.

The focus of the IAR external control score is on the significant others in a students' environment rather than on a variety of sources and agents such as luck, fate, and impersonal social forces. As such, the IAR reports only one score for external locus of control. Internal locus of control, the acceptance of responsibility, was assumed to encompass two situations. There are those situations whose outcomes are perceived to be positive when assuming credit would be pleasant and those whose outcomes are perceived to be negative when assuming blame would be unpleasant. The dynamics involved in accepting a successful outcome versus an unsuccessful outcome may vary from individual to individual. Thus, the IAR contains two subscales of equal numbers of questions, one pertaining to attributions of responsibility for success experiences (I^+) and the other to attributions of responsibility for failure experiences (I^-). A total internal score is calculated by adding the internal attributions for success and failure. The test consists of 34 items on which the subject checks one of two answers indicating either an internal locus of control or an external locus of control (see Appendix I).

Information on the reliability of the IAR is given by Wolk and Eliot (1974) and Crandall, Katkovsky, and Crandall (1965). The test-retest reliability after a three-week interval was reported by Wolk and Eliot (1974) to be .55 for internal positive, .60 for internal negative and .62 for total internal scores, with a sample of 160 elementary students. Crandall, Katkovsky, and Crandall (1965) reported that based on forty-seven children in grades 3, 4, and 5 re-tested on the IAR after a two-month interval the test-retest reliability was .66 for internal positive, .74 for internal negative, and .69 for total internal scores. These correlations were all significant at the $p < .001$ level. Seventy ninth-grade subjects were similarly tested and revealed reliability coefficients of .47 for internal positive, .69 for internal negative, and .65 for total internal scores . These correlations were also significant at the $p < .001$ level. Crandall, Katkovsky, and Crandall (1965) also selected a sample of 923 elementary and high-school students drawn from five different schools to represent children from diverse kinds of communities. They reported split-half reliabilities for the two subscales of the IAR from a random sample of 130 of the 923 elementary subjects to be .54 for internal positive and .57 for internal negative scores. A similar random sample with older children revealed correlations of .60 for both internal positive and internal negative scores.

While the reported reliability for the internal positive, internal negative, and total internal scores for IAR is within an acceptable level, correlations between the internal positive and internal negative subscales of the IAR are generally low (see Table 12). Crandall, Katkovsky, and Crandall (1965) suggest that the reason for such low correlations is that acceptance of responsibility for successful intellectual-academic experiences is different from acceptance of failure experiences. As the total score is a composite of the internal positive and internal negative, care must be observed to ensure that important differences between self-responsibility for success and failure are not masked by use of the total score only.

In addition to having acceptable test-retest and split-half reliability for a locus of control instrument, the validity of the IAR according to Crandall, Katkovsky, and Crandall, (1965) is good and in keeping with predictions from personality theory and common observations. The IAR scores are positively and significantly related (.34 to .53) to reading, language, and math subscores and total achievement-test scores as well as report cards in the elementary grades. The IAR has been used extensively in research related to achievement (Clifford & Cleary, 1972; Delisle & Renzulli, 1982), giftedness (Kanoy, Johnson, & Kanoy, 1980), and academic performance (Crandall & Lacey, 1972; Messer, 1972; Powell, 1971). As a measure of locus of control, the IAR appears to have good reliability, reasonable validity, and is appropriate for the sample and construct examined.

Table 12

Correlations of IAR Subscale Scores

Grade	Sample Number	Correlations I+ vs. I-
5	99	.11
6	166	.38
8	161	.40
10	183	.43

Adapted from
Crandall, Katkovsky, & Crandall, (1965).
Table 2, p. 100 - 101.

Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) is considered to be a suitable test to assess locus of control. The IAR has been widely accepted and used in educational research to measure internal and external locus of control through examining a child's beliefs regarding responsibility for outcomes in academic achievement situations. In the examination of control of various agents, the IAR limits the source of external control to persons whom the individual is most likely to contact, and eliminates factors such as personality and self-determination.

The three orientations of the IAR (general achievement, significant others, and internal control for success and failure) are suited to the research questions of this study.

Tests focusing on specific academic subject area differences in locus of control were not desired since a general rather than specific achievement discrepancy formed the criteria for differentiating gifted groups. Furthermore, the IAR is suited for children in the sixth through ninth-grades and for examining locus of control within the educational environment through its emphasis on achievement variables and interaction with significant others such as teachers, peers, and parents in academic environments. Gifted individuals have generally been observed to have higher internal locus of control (Fincham & Barling, 1978; Kanoy, Johnson, & Kanoy, 1980; Tetenbaum & Houtz, 1978). Because the IAR allows the total internal control analysis to be subdivided into acceptance of internal control for success and for failure, differences between underachievers and achievers with respect to these two scales may be revealed that might otherwise be masked by a total score.

Unusual Uses Task

To examine the differences in locus of causality, a task that was able to be administered over a wide range of grades, having two equivalent forms, easily rewarded, and not a measure of achievement or intelligence, was sought. An instrument meeting these requirements was found in the Torrance Tests of Creative Thinking (Torrance, 1966). The Torrance Tests of Creative Thinking have four batteries of test activities; two are verbal and two figural. The Unusual Uses Task forms a section of the verbal battery. Each battery has two forms, Form A and Form B. For the Unusual Uses Task, Form A, students are asked, within a time frame, to list as many uses as they can imagine for cardboard boxes. Form B demands the same skills from the individual except substitutes tin cans for cardboard boxes (see Appendix II). The Unusual Uses Task for tin cans and cardboard boxes from the Verbal Tests Form A and B respectively was originally adapted from the Guilford Brick Uses Test. Torrance felt that the use of tin cans and cardboard boxes rather than bricks was preferable since cans and boxes are more available for children to use in their play. Since an almost immediate response to tin cans or cardboard

boxes is to use them as containers, this task is considered by the Torrance manual to be an activity that taps into individuals' ability to free themselves from a well-established pattern of thought.

The Unusual Uses Task met the criteria of having a low correlation with intelligence and achievement tasks. Owens (1964), for example, reported a low correlation between the Unusual Uses Task and the Lorge-Thorndike Intelligence Test. Low correlations with achievement were also established. Torrance (1966) explains that: "A deliberate and consistent effort has also been made to keep the test tasks free of technical or subject matter content" (p. 24).

Also, the Unusual Uses Task is able to be administered from kindergarten through graduate school. Torrance (1966) states that: "One special advantage of the test tasks that constitute Figural and Verbal Forms A and B is that they can be administered at all educational levels" (p. 24). The ability of the Unusual Uses Tasks to be a test instrument over a wide range of educational levels is of benefit since the task desired was to be administered to underachievers as well as to achievers and over several grade levels.

In addition, two equivalent forms were required. Forms A and B of the Unusual Uses Task are considered equivalent according to the Torrance Tests of Creative Thinking Manual. Torrance (1966) also states that: "The simple practice effects of taking the tests do not seem to have a great deal of effect on performance and are as likely to lower performance as to increase it".(p. 23). Therefore, it is expected that differences in results between the two tests will be a result of the reward offered and not from practice effects.

Torrance (1966) considers the Unusual Uses Task to measure fluency, flexibility, originality, and elaboration. In using these tasks to examine locus of causality with and without external reward, scoring and timing were modified such that the emphasis of the task in this research was on fluency only. This modification provided ease of administration of reward as well as a simple, standardized scoring procedure. Thus a student's score was the difference in the number of responses recorded on the second task

(with reward) minus the first task (without reward). The scoring change was established to remove the threat of failure or response with inadequate answers and to eliminate the assessment of flexibility, originality, and elaboration. Student/examiner rapport was established prior to the administration of the task to promote a cooperative, no-fail environment that was non-threatening.

Timing changes were also adopted. Administration of the Unusual Uses Task normally requires a ten-minute period. In order to decrease the task requirement and to reduce interference by factors such as flexibility, originality, and elaboration, the time was shortened to a five minute period. It was expected that all students would be able to continue to write for this period of time before running out of ideas or becoming distracted. A more standardized fluency measure for all students was, therefore, anticipated.

The adaptations of the Unusual Uses Task for the present research have not been used previously and therefore no data on reliability or validity are presently available. The Unusual Uses Task has been reported to be both reliable and valid (Mackler, 1962; Owens, 1964). Reliability and validity are not expected to have been diminished by the adaptation in the present research since scoring procedures have been simplified with the elimination of flexibility, originality, and elaboration components. The reduction of time is expected to have no effect on reliability but will likely change the range of scores that would otherwise have been produced.

D. Collection of Data

Data were collected over a five-week period of time starting at the end of January, 1987, and finishing by the end of February. Crandall's Intellectual Achievement Responsibility Questionnaire and the Unusual Uses Tasks with and without external reward were part of a battery of tests administered over an one hour and fifty minute time period. The battery was part of a larger research project to examine the profile of the underachieving gifted student. The other tests involved in the battery were Cornell's

Critical Thinking Test Level X, Coopersmith's Self Esteem Inventory, Paris's Reading Awareness Questionnaire, and Mulcahy's Error Detection Task. All tests could be group administered and consequently all subjects in a school were tested concurrently by the researcher.

Crandall's Intellectual Achievement Responsibility Questionnaire and the Unusual Uses Tasks were administered to students at their individual schools within the Edmonton Catholic School System by the researcher over the five week period. The student's allocated category, achiever or underachiever, was blind to both the subject and the examiner at the time of testing. Results are expected to be relatively consistent within and between classrooms as tests, administration, and scoring were consistent and standardized.

Explanation of the project was given to the students. Subjects were informed that they had been selected because they appeared to have good potential. The rationale of the testing was explained in terms of a project to discover factors that enable students to achieve better. Benefits to the students were explained as potential changes within the school to appropriately suit student needs. Subjects were informed that all responses would be kept confidential and that reporting of the findings would be on the group response and not on individual response. Students were encouraged to do their best possible work.

Subjects began the testing session with the first Unusual Uses Task without reward. After the directions were read they were told they would have five-minutes to list as many uses as possible. Following the Unusual Uses Task, Cornell's Critical Thinking Test Level X was administered. As this test required approximately fifty-minutes a ten-minute break was provided upon its completion. Students were also informed that they could leave the room or get up and stretch at any time they might feel fatigued. Approximately one-half of the way through the testing session, following the break, students completed Coopersmith's Self Esteem Inventory, Crandall's Intellectual Achievement Responsibility Questionnaire, Paris's Reading Awareness Questionnaire, and

Mulcahy's Error Detection Task. The last task administered was the second Unusual Uses Task with reward. All subjects were informed of the examiner's desire to present a token of his appreciation to them for having written the tests. It was explained that although they deserved much more, due to budgetary restrictions the best that could be offered was a jelly bean for each response recorded within a five-minute time period on the final Unusual Uses Task. Subjects appeared to be encouraged by this gesture and did not respond with cynical comments or mannerisms that would suggest perceived tokenism.

To test for possible order effects on the unusual uses for tin cans versus unusual uses for cardboard boxes forty students, twenty achievers and twenty underachievers, were randomly selected and administered the Unusual Uses Tasks in reverse order. The means of underachieving and of achieving students who had received the tasks in reverse order were compared using t-tests with the means of the underachieving and of the achieving students respectively who received the tasks in regular order. There were no significant differences in order of administration of the two tasks. [underachievers first task ($df = 19$, $t = 1.403$, $p = .1768$), underachievers second task ($df = 19$, $t = -1.712$, $p = .1031$), achievers first task ($df = 19$, $t = 1.378$, $p = .1842$), and achievers second task ($df = 19$, $t = -.235$, $p = .8164$)]

E. Analysis of Data

Data were analyzed by two factor anova and repeated measure anova. The independent variables were achievement and grade. There were two levels of achievement: underachievement and achievement. There were four grade levels; grades six, seven, eight, and nine. The dependent variables were locus of control and locus of causality. Analysis of gender differences was made post-hoc through the use of two factor anova when it was determined that grades could be collapsed. The use of a product-moment correlation was used to determine the correlation between locus of control and locus of

causality. Correlation was also used to compare the relationship of locus of control and locus of causality to achievement and to intelligence.

F. Hypotheses

The main purpose of this study was to examine the profiles of underachieving gifted students and achieving gifted students with a view to examining possible differences in locus of control and locus of causality as attributing factors to explain underachievement. Accordingly, the following hypotheses were proposed.

1. Differences in Total Internal Locus of Control. Findings with general population groups support a positive correlation between internal locus of control and achievement behavior (Crandall, Katkovsky, and Crandall, 1965). However, studies examining total internal locus of control with gifted underachievers and achievers at the elementary grade level have produced ambiguous findings. Kanoy, Johnson, and Kanoy (1980) using Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) reported significantly higher total internal locus of control scores for achievers, whereas Davis and Connell (1985) using Cornell's Multidimensional Measure of Children's Perceptions of Control obtained opposite results. Gifted subjects are reported by Fincham & Barling (1978) and by Tidwell (1980) to have a higher internal locus of control or conversely smaller external locus of control scores than equal age peers. Due to the ambiguity of findings it appears reasonable to predict that no significant difference in locus of control will be revealed between underachieving and achieving gifted subjects. Furthermore, there is no evidence to suspect a different effect over grades, although with increasing age both underachievers and achievers might be expected to increase in internal control (Crandall, Katkovsky & Crandall, 1965; Cromwell, 1963). Therefore, the null hypotheses to be tested are:

1.1 There will be no significant difference in total internal locus of control as measured by Crandall's Intellectual Achievement Responsibility

Questionnaire (IAR) between underachieving and achieving gifted students across all grades.

1.2 For both gifted underachievers and gifted achievers there will be no difference in total internal locus of control within grades as measured by Crandall's Intellectual Achievement Responsibility Questionnaire.

2. Comparisons between Subscales of Internal Locus of Control. The study by Kanoy, Johnson, and Kanoy (1980) indicated differences between the scores on positive internal events (the acceptance of responsibility when events are successful) and negative internal events (the acceptance of responsibility when events are unsuccessful) among underachieving and achieving grade four students. Differences were reported between gifted underachieving and achieving students with respect to negative internal events but not with positive internal events. The study also revealed that gifted achievers and underachievers generally exercised greater control for positive internal than for negative internal events. Notwithstanding the results of this study, there is not enough definitive evidence to anticipate similar findings from the present research given the differences in sample composition and size. With this point in mind, the null hypotheses to be tested are:

2.1 There will be no significant difference between the underachieving and achieving gifted students with respect to scores for acceptance of positive internal events (I+) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire.

2.2 There will be no significant difference between the underachieving and achieving gifted students with respect to scores for acceptance of negative internal events (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire.

2.3 No significant differences between positive internal events (I+) and negative internal events (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire will be exhibited by underachieving gifted students.

2.4 No significant differences between positive internal events (I+) and negative internal events (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire will be exhibited by achieving gifted students.

3. Differences in Internal Locus of Causality. Locus of causality through a reward reinforcement comparison task with gifted subjects has not previously been examined. Although the task primarily encompasses the process of locus of causality,

other intervening variables such as test fatigue and salience of the reward might confound the results. Nevertheless, since findings with general population groups support a positive correlation between internal locus of causality and achievement behavior, it appears reasonable to investigate whether a significant difference in the two tasks across grades and in the change in number of responses between the two tasks will be noted for the underachieving and the achieving gifted. Therefore, the null hypotheses are:

> 3.1 There will be no significant difference across grades on the first Unusual Uses Task (Task 1) between the underachieving and the achieving gifted students.
>
> 3.2 There will be no significant difference across grades on the second Unusual Uses Task (Task 2) between the underachieving and the achieving gifted students.
>
> 3.3 There will be no significant difference in change in number of responses between the two tasks for the underachieving and the achieving gifted students.

4. Relationship between Locus of Control and Locus of Causality. The literature (De Charms, 1981; Deci, 1975, Lefcourt, 1982) supports the concept that there is poor correlation between locus of control and locus of causality. Locus of control is related to theories of attribution and social learning whereas locus of causality is related to cognitive and Gestalt theories. Accordingly, the null hypothesis is:

> 4.1 There will be no significant correlation between scores for total internal locus of control as measured by Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) and scores for locus of causality as measured by change in number of responses between Unusual Uses Task one and Task two.

CHAPTER IV

RESULTS

Two factor analysis of variance (anova) and an analysis of variance with repeated measures were used to test for significant differences between the underachieving and achieving gifted subjects on locus of control and locus of causality. A comparison between the locus of control and locus of causality measures was conducted using a product-moment correlation. Finally, post hoc analysis of gender differences was made through the use of two factor analysis of variance when it was determined that grades could be collapsed. Post hoc correlations between locus of control and locus of causality with achievement and intelligence were also carried out.

A. Differences in Total Internal Locus of Control

Total internal control for the underachieving and achieving gifted subjects (see Appendix III) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire was examined by a two factor analysis of variance. The results of the analysis across grades failed to reveal significant differences between underachieving and achieving gifted subjects. Table 13 reveals the main effect for achievement status to be $F(1,3) = .695$, $p < .4057$. Similarly there were no significant increases in internal scores with grade, the main effect for grades being $F(1,3) = .246$, $p < .8639$. There were also no significant interaction effects with $F(1,3) = .326$, $p < .8069$. Thus Hypothesis 1.1 that there would be no significant difference in total internal locus of control between underachieving and achieving gifted students across all grades was confirmed. Similarly, Hypothesis 1.2, that for both gifted underachievers and gifted achievers there would be no difference in total internal locus of control within grades was also confirmed.

Table 13

Two Factor Anova of Achievement Status and Grades on Total Internal Locus of Control

MEANS					
	Grade Six	Grade Seven	Grade Eight	Grade Nine	Totals
Underachiever:	25.565	25.038	24.474	24.474	24.931
Achiever:	25.062	25.750	25.174	25.444	25.364
Totals:	25.359	25.348	24.857	24.946	25.134

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	8.862	8.862	.695	.4057
Grades (B)	3	9.415	3.138	.246	.8639
AB	3	12.449	4.15	.326	.8069
Error	156	1988.524	12.747		

B. Comparison Between Subscales of Internal Locus of Control

The results of the two factor analysis of variance across grades with positive internal scores are reported in Table 14. The main effect for achievement status was not significant [$F(1,3) = 1.54$, $p < .2165$]. There were also no significant interaction effects [$F(1,3) = .951$, $p < .4174$]. The main effect for grades was statistically significant [$F(1,3) = 2.988$, $p < .0329$] with scores decreasing with higher grades. Since the main effect for achievement status was not significant, Hypothesis 2.1, that there would be no significant difference between the underachieving and achieving gifted students with respect to scores for acceptance of positive internal events (I+) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire was confirmed.

Table 14

Two Factor Anova of Achievement Status and Grades on Positive Internal Locus of Control

MEANS					
	Grade Six	Grade Seven	Grade Eight	Grade Nine	Totals
Underachiever:	14.522	13.692	13.053	12.474	13.506
Achiever:	14.250	13.900	13.435	13.778	13.805
Totals:	14.410	13.783	13.262	13.108	13.646

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	6.6	6.6	1.54	.2165
Grades (B)	3	38.414	12.805	2.988	.0329
AB	3	12.232	4.077	.951	.4174
Error	156	668.525	4.285		

The results of the two factor analysis of variance across grades with negative internal scores are reported in Table 15. The main effect for achievement status was not significant [$F(1,3) = .026$, $p < .8724$]. The main effect for grades was similarly not significant [$F(1,3) = .889$, $p < .4483$]. There were also no significant interaction effects [$F(1,3) = .265$, $p < .8507$]. Variation between negative internal score means was narrow, ranging from 10.812 to 12.0. Thus Hypothesis 2.2, that there would be no significant difference between the underachieving and achieving gifted students with respect to scores for acceptance of negative internal events (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire was confirmed.

Table 15

Two Factor Anova of Achievement Status and Grades on Negative Internal Locus of Control

MEANS					
	Grade Six	Grade Seven	Grade Eight	Grade Nine	Totals
Underachiever:	11.043	11.346	11.421	12.000	11.425
Achiever:	10.812	11.850	11.739	11.667	11.558
Totals:	10.949	11.565	11.595	11.838	11.488

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	.166	.166	.026	.8724
Grades (B)	3	17.146	5.715	.889	.4483
AB	3	5.106	1.702	.265	.8507
Error	156	1002.895	6.429		

A comparison of the results with regard to grade effects in the above analyses indicate a significant difference for positive internal scores (Table 14) but no significant differences for either total (Table 13) or negative (Table 15) internal scores. The discrepancy in significance of results is puzzling, since the total internal internal score is the

sum of the positive internal score and the negative internal score. Thus, if significant differences exist on the positive internal score, then they should also appear on the total internal score. In view of the fact that no significance was found on the total internal scores, caution must be exercised in assuming significant grade differences for positive internal control. Inspection of means (Table 14) indicates little variation in positive internal score means which range from 14.522 to 12.474 for underachievers and 14.250 to 13.778 for achievers. Thus, findings of significance for positive internal scores appear to be an artifact of the computation of multiple anovas.

It was accordingly assumed that mean scores across grades for each of the three internal sets of scores were similar and could be collapsed for further analysis, there being no significant interaction effects. With grades collapsed, a two factor repeated measure analysis of variance was conducted to determine if there were differences in negative internal control as opposed to positive internal control. Consistent with the previous analyses, there were no main effects for achievement with $F(1,162) = .616$, $p < .4338$ (see Table 16). Similarly, no significant interaction was found with $F(1, 162) = .123$, $p < .726$. However, significant differences for positive internal control as opposed to negative internal control were exhibited by underachieving and achieving gifted students with $F(1,162) = 83.373$, $p < .0001$. Both underachievers and achievers accepted greater responsibility for positive internal control (means of 13.506 and 13.805 respectively) as opposed to negative internal control (means of 11.425 and 11.558 respectively). Thus Hypothesis 2.3, that no significant differences between positive internal control (I+) and negative internal control (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire would be exhibited by underachieving gifted students was rejected. Similarly, Hypothesis 2.4, that no significant differences between positive internal control (I+) and negative internal control (I-) as measured by Crandall's Intellectual Achievement Responsibility Questionnaire, would be exhibited by achieving gifted students was also rejected.

Table 16

Two Factor Repeated Measures Anova for Internal Positive and Negative Locus of Control

	Internal Positive	Internal Negative	Averages
Underachiever:	13.506	11.425	12.466
Achiever:	13.805	11.558	12.682
Averages:	13.646	11.488	12.567

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	3.822	3.822	.616	.4338
Subjects within groups	162	1005.702	6.208		
Repeated Measure (B)	1	382.061	382.061	83.373	.0001
AB	1	.565	.565	.123	.726
B X subjects w. groups	162	742.374	4.583		

C. Differences in Internal Locus of Causality

Internal locus of causality (see Appendix III) was assessed by the change in the number of responses from the first task (no reward) to the second task (reward). The first Unusual Uses Task administered to the underachieving and achieving gifted subjects was examined by a two factor analysis of variance. The results of the analysis across grades (see Table 17) failed to reveal significant differences between underachieving and achieving gifted subjects, [$F(1,3) = .157$, $p < .6927$] or between grades [$F(1,3) = 1.998$, $p < .1165$]. There was no significant interaction effect with $F(1,3) = .15$, $p < .9295$. Thus Hypothesis 3.1, that there would be no significant difference across grades on the first Unusual Uses Task (Task 1) between the underachieving and the achieving gifted students was confirmed.

Table 17

Two Factor Anova of Achievement Status and Grades on the First Unusual Uses Task

	Grade Six	Grade Seven	Grade Eight	Grade Nine	Totals
Underachiever:	12.130	12.385	14.105	12.105	12.632
Achiever:	12.938	12.800	14.739	11.500	13.104
Totals:	12.462	12.565	14.452	11.811	12.854

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	3.925	3.925	.157	.6927
Grades (B)	3	150.144	50.048	1.998	.1165
AB	3	11.276	3.759	.150	.9295
Error	156	3907.414	25.048		

The second Unusual Uses Task was also examined by a two factor analysis of variance. Again the results of the analysis across grades failed to reveal significant differences between underachieving and achieving gifted subjects. Table 18 reveals the main effect for achievement status to be $F(1,3) = 1.533$, $p < .2175$. The main effect for grades was $F(1,3) = 1.7$, $p < .1694$. There was no significant interaction effect with $F(1,3) = .19$, $p < .9034$. Thus Hypothesis 3.2, that there would be no significant difference across grades on the second Unusual Uses Task between the underachieving and the achieving gifted students was confirmed.

Table 18

Two Factor Anova of Achievement Status and Grades on the Second Unusual Uses Task

	Grade Six	Grade Seven	Grade Eight	Grade Nine	Totals
Underachiever:	16.565	16.577	17.000	13.632	16.023
Achiever:	17.812	16.650	18.609	15.722	17.260
Totals:	17.077	16.609	17.881	14.649	16.604

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	63.193	63.193	1.533	.2175
Grades (B)	3	210.179	70.060	1.700	.1694
AB	3	23.446	7.815	.190	.9034
Error	156	6430.496	41.221		

Since no significant interaction or main effects were found across grades in the previous analyses (see Table 17 and 18), grades were collapsed and a repeated measure analysis of variance was employed to assess significant differences in responses between the first Unusual Uses Task and the second Unusual Uses Task (see Table 19). The results indicate no significant differences between underachieving and achieving gifted students [$F(1,162) = 1.167$, $p < .2817$]. No significant interaction was found with F(1,

162) = .786, p < .3765. However, significant differences between the first task (without reward) and the second task (with reward) were found [F(1,162) = 75.863, p < .0001]. Both underachievers and achievers increased the number of responses with reward (means of 16.023 and 17.260 respectively) as opposed to without (means of 12.623 and 13.104 respectively). Thus Hypothesis 3.3, that there would be no significant difference in number of responses between the two Unusual Uses Tasks for the underachieving and the achieving gifted students was rejected.

Table 19

Locus of Causality Two Factor Repeated Measures Anova for First Task and Second Task

	First Task without Reward	Second Task with Reward	Averages
Underachiever:	12.632	16.023	14.328
Achiever:	13.104	17.260	15.182
Averages:	12.854	16.604	14.729

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	59.614	59.614	1.167	.2817
Subjects within groups	162	8277.737	51.097		
Repeated Measure (B)	1	1153.125	1153.125	75.863	.0001
AB	1	11.954	11.954	.786	.3765
B X subjects w. groups	162	2462.421	15.200		

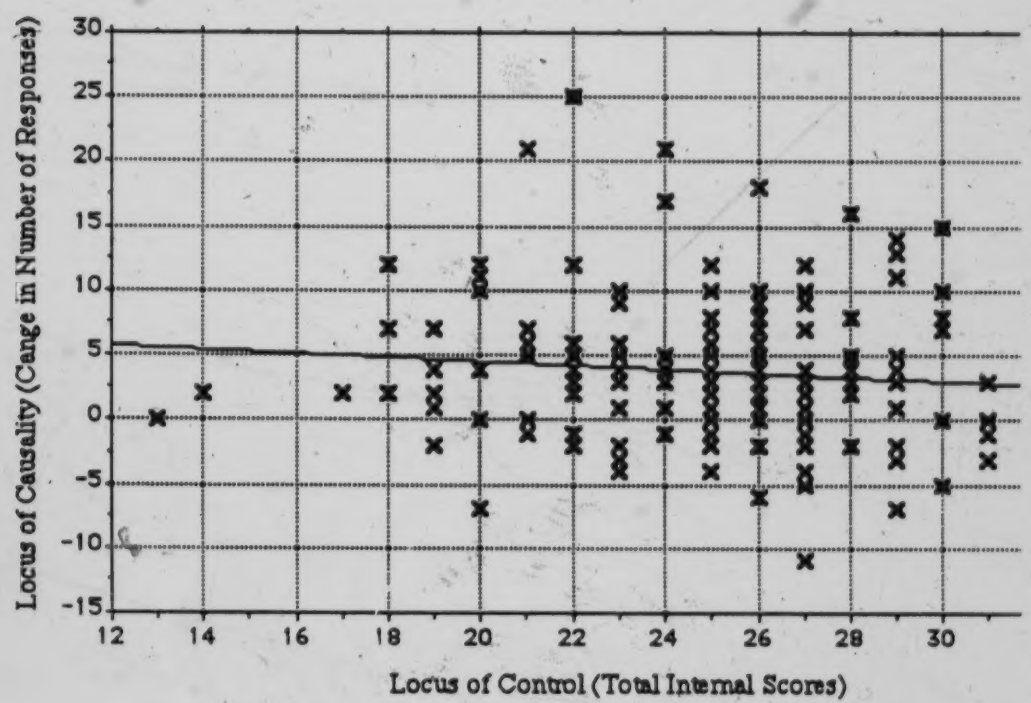
D. Relationship Between Locus of Control and Locus of Causality

A correlation was calculated to determine the relationship between locus of control and locus of causality. Total scores on Crandall's Intellectual Achievement Responsibility Questionnaire were used as the locus of control measure and change in number of responses between the two Unusual Uses Tasks at the locus of causality measure. Change in number of responses for locus of causality was calculated by subtracting the number of responses on the first task from the number of responses on the second task for each subject.

A scattergram of the data was plotted to determine whether a linear relationship and homoscedasticity existed. From the scattergram presented in Table 20, it is apparent that the assumption of homoscedasticity has not been met. Points appear to be randomly distributed without a linear relationship. Calculation of the product-moment correlation revealed a correlation coefficient of -.094, covariance of -1.831, and a R^2 of .009 . Thus, Hypothesis 4.1, that there would be no significant correlation between scores for total internal locus of control as measured by Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) and scores for locus of causality as measured by change in number of responses between the first and second Unusual Uses Task receives support.

Table 20

Scattergram of Locus of Control with Locus of Causality



E. Summary

No significant differences were found between the underachieving and achieving gifted subjects across grades with internal positive, negative, and total internal locus of control scores. Similarly, no significant differences were found between the underachieving and achieving gifted subjects on locus of causality scores. In both cases there were no significant interaction effects. However, significant differences for positive internal control as opposed to negative internal control were exhibited by both underachieving and achieving gifted students. Students assumed greater responsibility on positive internal control than on negative internal control. Significant differences were also found between the locus of causality task one and task two. Underachievers and achievers both performed significantly better in the task with reward than in the task involving no external reward. Finally, when internal locus of control was correlated with locus of causality no significant correlation was found.

F. Supplementary Analyses

Gender and Achievement with Internal Locus of Control and Locus of Causality

Gender differences on locus of control have been noted by Crandall, Katkovsky, and Crandall (1965), Messer (1972), and Duke and Nowicki (1974) but not by Rupp and Nowicki (1978). Similarly, for locus of causality, gender differences have been recorded by Deci, Betley, Kahle, Abrams, and Porac (1981) and Weinberg and Ragan (1979). However, when the study by Deci, Betley, Kahle, Abrams, and Porac was replicated six years later by Blanck, Reis, and Jackson (1984) no significant gender differences were reported on locus of causality. Because of the inconsistencies in gender differences reported, the investigation of gender differences in the present sample of underachieving and achieving gifted students is appropriate.

Since no main effects for grade and no interaction were found in analyses involving either locus of control and locus of causality, supplementary analysis on gender differences was possible by collapsing grades. The effects of gender and achievement were examined with respect to positive, negative, and total internal locus of control and with locus of causality. Results from both the locus of control and the locus of causality analyses (see Table 21) revealed no significant main effects of gender or achievement. There were also no significant interaction effects.

Table 21

Two Factor Anova for Total, Positive, and Negative Locus of Control and Locus of Causality

Total Internal Locus of Control			
	Female	Male	Averages
Underachiever:	25.071	24.800	24.931
Achiever:	25.258	25.435	25.364
Averages:	25.151	25.121	25.134

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	6.745	6.745	.537	.4647
Sex (B)	1	.090	.090	.007	.9328
AB	1	2.008	2.008	.160	.6898
Error	160	2009.226	12.558		

Positive Internal Locus of Control			
	Female	Male	Averages
Underachiever:	13.524	13.489	13.506
Achiever:	13.581	13.957	13.805
Averages:	13.548	13.725	13.646

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	2.75	2.75	.610	.4359
Sex (B)	1	1.162	1.162	.258	.6123
AB	1	1.687	1.687	.374	.5415
Error	160	721.182	4.507		

Negative Internal Locus of Control			
	Female	Male	Averages
Underachiever:	11.548	11.311	11.425
Achiever:	11.677	11.478	11.558
Averages:	11.603	11.396	11.488

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	.882	.882	.138	.7108
Sex (B)	1	1.898	1.898	.297	.5865
AB	1	.014	.014	.002	.9628
Error	160	1022.302	6.389		

Locus of Causality			
	Female	Male	Averages
Underachiever:	3.167	3.600	3.391
Achiever:	4.032	4.239	4.156
Averages:	3.534	3.923	3.750

Source:	DF:	Sum Squares:	Mean Square:	F-test:	P value:
Achievement Status (A)	1	22.635	22.635	.736	.3922
Sex (B)	1	4.097	4.097	.133	.7156
AB	1	.513	.513	.017	.8974
Error	160	4919.971	30.75		

There thus appear to be no significant differences between gender and achievement with regard to locus of control and locus of causality.

Correlation Matrix for Locus of Control, Locus of Causality, Intelligence, and Achievement

Since no significant differences were found for achievement status with locus of control or locus of causality, a correlation matrix was produced to determine whether a significant correlation was evident between locus of control and locus of causality with respect to achievement as measured by the Canadian Test of Basic Skills and with intelligence as measured by the Canadian Lorge-Thorndike Intelligence Test. Production of a product-moment correlation matrix (see Table 22) revealed significant correlations between parts of the same tests but no significant correlation between different measures.

Comparisons of the correlations reported in the literature with those obtained in this study were sought.

Positive, negative, and total internal locus of control did not correlate significantly with achievement as measured by the Canadian Test of Basic Skills. These results were expected based on the two factor anovas conducted on locus of control with achievement status. Correlations ranged from -.234 to .108. From the sample of underachieving and achieving gifted students, locus of control was not a good predictor of intelligence or achievement.

Locus of causality also did not correlate significantly with achievement as measured by the Canadian Test of Basic Skills or with intelligence as measured by the Lorge-Thorndike. Correlations between locus of causality and intelligence ranged from -.091 to .046 and between locus of causality and achievement ranged from -.124 to -.063.

Correlations between internal positive locus of control and internal negative locus of control as measured by Crandall's Intellectual Achievement Responsibility Questionnaire (IAR) are reported by Crandall, Katkovsky, and Crandall (1965) to range from .11 to .43 (see Table 12) . Correlation between the internal positive locus of control and internal negative locus of control in this study was found to be .154 which falls within the same range. It is interesting that the correlation between total internal locus of control and positive internal locus of control was significant (r =.710) and between total internal locus of control and negative internal locus of control was also significant (r = 805), while the correlation between negative internal locus of control and positive internal locus of control was extremely low (r = .154). This variation suggests that the two subscales are measuring different concepts and would confirm Crandall, Katkovsky, and Crandall's (1965) assumption to this effect.

On the Canadian Lorge-Thorndike, the correlation between Full Scale and Verbal was significant (r =.667) and between Full Scale and Non-Verbal was also significant (r = 758), while the correlation between Verbal and Non-Verbal was extremely low (r = .022).

Table 22

Correlation Matrix for Positive, Negative, and Total Locus of Control (LC); Locus of Causality; Verbal, Non Verbal and Full Scale Score from Lorge-Thorndike (LT); and Vocabulary, Reading Comprehension, Mathematics Computation/Concepts, and Mathematics Problems from the Canadian Test of Basic Skills (CTBS)

	Total LC	Positive LC	Negative LC	Locus of Causality	LT Verbal	LT Non Verbal	LT Full Scale	CTBS Vocab.	CTBS Reading	CTBS Math Com.
Total LC	1									
Positive LC	.710 *	1								
Negative LC	.805 *	.154	1							
Locus of Causality	-.121	-.075	-.107	1						
LT Verbal	-.093	.086	-.203	-.063	1					
LT Non Verbal	-.036	-.099	.034	-.110	.022	1				
LT Full Scale	-.088	-.017	-.110	-.124	.667 *	.758 *	1			
CTBS Vocab.	-.085	-.234	.078	-.077	-.006	.070	.052	1		
CTBS Reading	-.070	-.212	.081	-.091	.009	.142	.114	.681 *	1	
CTBS Math Com.	.049	.012	.058	-.074	-.024	.132	.087	.287	.343 *	1
CTBS Math Prob.	.074	-.006	.108	.046	-.067	.194	.107	.365 *	.494 *	.773 *

CTBS - Canadian Test of Basic Skills
LT - Lorge-Thorndike
LC - Locus of Control

* significant at $p < .05$

The lack of significant correlation between the Verbal and Non-Verbal Scales is inconsistent with significant correlations (r = .612 to .558) in the average population as reported in the Lorge-Thorndike manual (see Table 11). The findings of this study may be a result of the uniqueness of the sample which was comprised of students who were achieving one and one-half standard deviations above or below expected potential.

Information was not available on the correlation between subtests of the Canadian Test of Basic Skills. In this study, significant correlations between vocabulary and reading (r = .681), vocabulary and math problems (r = .365), reading and math computation/concepts (r = .343), reading and math problems (r = .494), and math concepts and math problems (r = .773) were found. No significant correlation was noted for math computation/concepts and vocabulary (r = .287). Further research is indicated to determine whether these subtest correlations are consistent in other samples.

Correlations between the Lorge-Thorndike and the Canadian Test of Basic Skills, Vocabulary, Reading, Comprehension, and Math Subtests were expected to be low as the present sample was selected on the basis of a multiple regression procedure which subtracted the predicted score from the obtained scores. The expected low correlations were obtained (r = -.006 to .142). The Lorge-Thorndike manual reports correlations between the Lorge-Thorndike and achievement measures to range from .52 to .76.

CHAPTER V

DISCUSSION

A. Summary of the Study

This study was designed to investigate the relationships between locus of control and locus of causality with underachieving and achieving gifted students. Differences in internal locus of control, comparisons between the subscales of internal locus of control, differences in internal locus of causality, and the relationship between locus of control and locus of causality comprised the four areas examined in this research. Each of these areas will be discussed in turn.

Differences in Total Internal Locus of Control

Although Kanoy, Johnson, and Kanoy (1980) found a difference between underachieving and achieving gifted students' total internal locus of control using Crandall's Intellectual Achievement Responsibility Questionnaire (IAR), no significant difference in total internal locus of control across grades was obtained in this study. Findings from this study were based on gifted sixth, seventh, eighth, and ninth graders whereas Kanoy, Johnson, and Kanoy (1980) examined gifted fourth graders. Since research findings on total internal locus of control in adults (Gadzella, Williamson, & Ginther, 1985; Katz, 1967) differ from those found with children, the possibility arises that the age of subjects might influence total internal locus of control. Total internal locus of control may be highly correlated with factors such as maturity or development toward independence. This possible correlation may well explain the variation in findings.

The research of Kanoy, Johnson, and Kanoy (1980) encompassed one public school system, in Burlington, North Carolina. Rupp and Nowicki (1978), in examining total internal locus of control and achievement with average students in Hungary, reported

results conflicting with those found for average students in the United States. Thus, total internal locus of control findings may not be generalizable to a different environment or culture. The inconsistencies between the results reported by Kanoy, Johnson, and Kanoy (1980) and this research may be a factor of the characteristics of the environment or the culture of Burlington, North Carolina and Edmonton, Alberta.

Instruments used for sample selection differed between the Kanoy, Johnson, and Kanoy (1980) research and this study. The Kanoy, Johnson, and Kanoy (1980) research used the Cognitive Abilities Test to measure intelligence and to arrive at a prediction of achievement. Grade point averages represented actual achievement. In this study, the Lorge-Thorndike was used to measure intelligence and to predict achievement. The Canadian Test of Basic Skills was used to measure actual achievement. Differences in selection instruments may have resulted in non-equivalent samples.

Findings on the total internal locus of control of underachieving and achieving gifted students may well be influenced by factors such as age and grade of student, environment and culture, and sample selection. Each or all of these factors may have resulted in the dissimilarity in findings reported by Kanoy, Johnson, and Kanoy (1980) and this research.

Research into total internal locus of control that examines a comprehensive sample of students rather than a select group such as the gifted population, indicates a significant positive correlation between achievement and total internal locus of control (Chance, 1965; Lessing, 1969; Messer, 1972). Although the assumption that if students are not achieving to expectations they may have a low internal locus of control appears reasonable, this assumption was not supported with the gifted underachievers in this research. Two possible explanations may account for this unexpected event. First is the possibility of test instrument error. Second is the possibility that significant differences do not exist between gifted underachievers and achievers in the area of total internal locus of control. Both underachieving and achieving gifted groups may perceive themselves to be in control.

Thorndike (1963) expressed support for the first explanation that underachievement really refers to the limitations of instruments of prediction. He stated that "...there has been a tendency to forget that the aptitude test is, after all, only one sample of behavior from which another, usually somewhat larger and somewhat different sample is being forecast" (p. 3). By comparing intelligence with achievement, Anastasi (1976) has commented that the procedure is misused: no two tests have a perfect correlation and, thus, measurement error will produce either an under- or over- prediction of predicted scores.

Responding to the complications arising from underachievement being described as a statistical artifact of testing error and procedures, Goldberg (1965) has conceded that "no matter how much of the discrepancy is due to errors of measurement and to statistical artifacts, a part of the dissonance between prediction and achievement probably lies within the social-psychological makeup of the individual" (p. 33). Karnes, McCoy, Zehrbach, Wollersheim, and Clarizio (1962) in their two-year study of elementary students found that:

> The tendency of the subjects to remain in the same relative position when ranked with the other members of their class repeatedly and over an extended period of time suggests that the academic underachiever represents a consistent personality manifestation which is not an artifact or errors inherent in psycho-educational measuring devices (p. 40).

Thus it appears that underachievement is more than the result of statistical and instrument error.

Description of a standard of human behavior and performance is complex and perfect correlation between intelligence and scholastic aptitude tests does not exist. Although some degree of overachievement or underachievement is inherent in prediction, in this research discrepancies have been kept to a minimum through the use of a multiple regression model and an analysis of the subject homogeneity on intelligence and on statistical differences related to achievement.

Rejecting the first explanation of a statistical artifact results in the consideration that the real differences between underachieving and achieving gifted with respect to total internal locus of control are not significant. The results of this present study indicate that a

high total internal locus of control was exhibited by both underachievers and achievers. The correlation between achievement and total locus of control as observed in the average population may not, in fact, be generalizable to the gifted population. Fincham and Barling (1978) and Tidwell (1980) have indicated that the gifted population in general has a significantly higher total internal locus of control than average or learning disabled students. High total internal locus of control associated with giftedness appears to be retained, despite underachievement in academic behavior. Even when gifted students are not achieving to predicted potential, they still appear to perceive that they are in control.

The high total internal locus of control associated with giftedness may also account for the stability of results across grades. No significant differences were found with either gifted underachievers or gifted achievers on total internal locus of control within grades. This concurs with previous studies reporting high total internal locus of control among gifted samples (Fincham and Barling 1978; Tidwell, 1980). A characteristic of underachieving and achieving gifted students, regardless of grade level, appears to be a high total internal locus of control.

Comparisons between Subscales of Internal Locus of Control

As with the total internal locus of control, no significant differences between gifted underachievers or achievers were found on either positive internal control (the acceptance of responsibility when events are successful) or negative internal control (the acceptance of responsibility when events are unsuccessful). The apparent lack of significant difference between the two groups affirms the perception that gifted students possess high total internal locus of control irrespective of achievement status.

Significant differences were evident however, between the scores on positive internal control and negative internal control for both underachieving and achieving gifted students across grades. Gifted achievers and underachievers expressed greater acceptance of control for positive internal than for negative internal events. These findings were in

keeping with the results reported by Kanoy, Johnson, and Kanoy (1980).

Two reasons may account for the finding that positive internal scores were greater than negative internal scores. First, the results may have arisen from the nature of the questions asked on Crandall's Intellectual Achievement Responsibility Questionnaire. Second, the superiority of positive internal control over negative internal control may be a product of giftedness.

The nature of the questions asked on Crandall's Intellectual Achievement Responsibility Questionnaire may have resulted in the difference between positive internal locus of control and negative internal locus of control. Gifted students may have difficulty responding to questions such as "when you have trouble understanding something in school..." and "when you read a story and can't remember much of it..." if they have never experienced problems of understanding at school or of reading material within their frustration level. Questions that on the surface appear quite straight forward may be much more complex to answer if they are outside the realm of the gifted student's experience.

Failures the gifted student might have experienced may have legitimately been outside their control. For example, if the gifted individual was considered to be an exemplary student who is not a behavior problem, that student might be placed among less well behaved children. The question..."Suppose you don't do as well as usual in a subject at school. Would this probably happen (a) because you weren't as careful as usual [internal negative response], or (b) because somebody bothered you and kept you from working?" assumes that academic failures have been experienced for a variety of reasons. If the gifted student succeeds in academic situations but is surrounded by behavior problems, then the only legitimate reason that may have resulted in failure may indeed have been outside the student's control. The "acceptance of responsibility when events are unsuccessful" questions may not be at a level commensurate with the gifted student's experiences of failure. Underachieving and achieving gifted students might, therefore, have significantly lower negative internal locus of control versus positive internal locus of

control scores because of the nature of the questions and of their abilities.

On the other hand, a difference in acceptance of control for positive internal events and negative internal events may be a product of giftedness. Students at the grade six, seven, eight, and nine level may tend to perceive success experiences as having resulted from their own efforts or abilities and failures as having resulted from circumstances beyond their control. Due to the disparity existing between acceptance of control for success and acceptance of control for failure, the possibility exists that as situations become more difficult or stressful, the gifted student may not have developed the ability to accept control for failures and, therefore, may not be able to effectively and constructively deal with the situations. This may, in part, explain the high school drop-out rate of bright children which is a concern expressed in gifted literature (Daniels, 1983; Millar, 1981). Given the limitations of this study in terms of grades represented, the extremes in sample selection on the basis of achievement, and the lack of supporting research to provide further confirmation that disparities between internal positive and internal negative locus of control exist in gifted students, it would be imprudent to make conjectures on factors that may correlate with lower negative internal locus of control. Further research is required to determine whether the pattern of acceptance of negative internal locus of control, as found in this study, persists and whether it correlates with factors such as student drop-out.

Differences in Internal Locus of Causality

The study of locus of causality with gifted subjects has not previously been undertaken. The use of the Unusual Uses Task for the purpose of investigating locus of causality by pairing task one (without reward) and task two (with reward) is in keeping with the concept measured. Task one, used to provide a basis for the comparison of internal motivation, elicited a wide range of responses (5 to 31) but did not reveal any differences between underachieving and achieving gifted students. With the introduction of a reward, the range of responses remained wide (6 to 34) but again no differentiation

between the two groups was revealed. However, the mean number of responses increased significantly with reward.

This reaction to reward was unexpected. Baron and Ganz (1972) reported that students with internal locus of causality worked better with internal rewards whereas students with an external locus of causality performed significantly better with an external reward. A similar result was reported by Eden (1975) when surveying male workers in an Israeli kibbutz. He found a negative correlation between financial rewards and internal locus of causality. The individual who has an internal locus of causality would be expected to be distracted by the external reward.

In this research, both the underachieving and the achieving gifted groups significantly increased their performance on the second task (with reward). In other words, external rewards improved the performance of both underachieving and achieving gifted students. Internally motivated students are not, apparently, immune to external motivation. Students who are internally motivated may be more susceptible than expected to the lure of external rewards. Educators may need to evaluate the use and effectiveness of external rewards in gifted programs and not neglect the use of external rewards with individuals who are normally perceived to perform all tasks for purely intrinsic reasons. Further research to determine the most effective pattern of external rewards for gifted students, however, is necessary.

Relationship between Locus of Control and Locus of Causality

The non-significant correlation obtained between locus of control and locus of causality responses is consistent with the assertions of De Charms (1981), Deci (1975), Lefcourt (1982), and Wong and Sproule (1984) that locus of control and locus of causality are distinct concepts. Locus of control comes from social learning and attribution theory whereas locus of causality stems from cognitive and Gestalt theory. These two concepts are not mutually exclusive, as all students possess both locus of control and locus of

causality. The degree to which an individual student possesses each of these loci may, however, be aspects of the personal characteristics that make every one of us unique. Furthermore, patterns of locus of control/locus of causality may exist and may distinguish different groups of students. Further research to differentiate between locus of control and locus of causality and to examine the commonalities in degree of each locus for specific groups of students is necessary.

Supplementary Analysis

In this present research no significant gender differences were obtained for underachieving or achieving gifted students on locus of control and locus of causality. Research, to date, has been inconsistent in findings related to gender differences. The present findings support recent research reporting no significant difference between gender and locus of control (Rupp & Nowicki, 1978) and between gender and locus of causality (Blanck, Reis, & Jackson, 1984). Blanck, Reis, and Jackson (1984) suggest that current studies reporting no gender differences, in contrast to the findings of gender differences in earlier studies, may be a reflection of societal changes with respect to attitudes governing gender. Further research is required to ensure that present findings are an accurate depiction and not a result of statistical artifact.

When achievement (as measured by the Canadian Test of Basic Skills) and intelligence (as measured by the Canadian Lorge-Thorndike) were correlated with locus of control and locus of causality, no significant statistical findings were evident. These results may be attributable to the uniqueness of the sample, but they do not offer much insight into potential factors that may contribute to underachieving and achieving for the gifted. Additional research is required, not only with locus of control and locus of causality, but also with other variables that may influence achievement status.

B. Implications for Future Research

Four major areas have been identified by this research as requiring further investigation to improve the understanding of the underachieving gifted student. The concepts of locus of control, locus of causality, the relationship between locus of control and causality, and factors that may contribute to underachievement have not yet been clarified. In fact, this research has raised a number of questions about their relationship to giftedness.

The study of total internal locus of control for this sample of gifted underachievers and achievers revealed no significant differences across grades. The question arises as to whether this was a peculiarity of the sample selected or whether these results can be replicated, given a comparable situation. Similarly, no significant differences were found for both gifted underachievers and achievers in internal locus of control with grades six, seven, eight, and nine. The questions that arise here are whether this is a unique phenomenon of young adolescents and whether this phenomenon would be found at either younger or older grades. An investigation, using a similar design, encompassing a wider range of grades and a diverse population group would assist in validating the results of this study. Without further research on locus of control with a variety of populations and educational levels, the generalizability of locus of control concepts may be questionable.

Underachieving and achieving gifted students did not differ significantly on positive internal control or negative internal control. The acceptance of positive internal control as opposed to the acceptance of negative internal control poses interesting questions for examination. Was this a product of the structure of the questions asked, or did a significant difference result from a characteristic of giftedness? Similarly, this is a characteristic of giftedness, what other populations may exhibit comparable patterns? Finally, does this difference in acceptance of control for success as opposed to acceptance of control for failure have educational implications?

The use of the Crandall Intellectual Achievement Responsibility Questionnaire as a

measure of locus of control should ideally be weighted with other measures of locus of control such as the Rotter Internal-External Control Scale. Variations in results would then have better grounds for discussion in terms of the uniqueness of the population rather than the validity of the test instrument.

Since little or no research on locus of causality with gifted students has been undertaken, it is essentially a new field. Replication of this research and extension of research efforts to examine the effects of rewards on other groups as well is indicated. In addition, research to determine the most effective pattern of external rewards for individuals with internal locus of causality is recommended.

Due to the complexity of the human personality, it is not possible to isolate one factor (eg. locus of control) and assume that modification of this factor will change all behavior. People are complex creatures and are governed by many factors which must be assessed in relation to one another as well as individually. Although locus of control and locus of causality are but two of the known factors, it is strongly recommended that investigation of their relationship to each other and to academic behavior be undertaken.

The multiplicity of factors that contribute to underachievement among the gifted population must be assessed. Correlations between locus of control with achievement and intelligence failed to yield significant results. Similarly, non-significant correlations were obtained on locus of causality with achievement and intelligence. What factors, then, contribute to underachievement in the gifted population?

There is a need for further examination of areas of personality related to the underachieving gifted. Underlying emotional problems and underachievement as an interpersonal defense have yet to be fully investigated. Family interaction attitudes or patterns of parental attitudes are worthy of study. Factors such as lower income and fewer social and educational opportunities may be a contributing factor to underachievement within the gifted. Social immaturity as a variable in underachievement has been suggested but not supported through empirical research. Low self-esteem and social defense to the

pressure to achieve or the reaction to perceived sex expectations has been purported but not yet substantiated.

Acknowledging that there are a wide variety of possible factors which may contribute to underachieving in the gifted does not nullify the importance of isolating the more relevant contributing factors. Until the major contributing factor or factors have been isolated from all possible causes, programs designed for the underachieving gifted child will continue to be marked by their variability and lack of empirical research. This lack of research is not a new phenomenon. French (1959) reported that, in general, "Gifted children are the greatest underachievers in our schools because their achievement is further below the limits of their capacity than any other group" (p. 87). Unfortunately, very little research into programs or services for the underachieving gifted has been undertaken. Only through a better understanding of the possible causes of underachievement and the nature of the underachiever will efforts to allow the gifted underachievers to circumvent the barbs that have entrapped them be effective.

REFERENCES

Abramson, L. Y., Garber, J., & Seligman, M. (1980). Learned helplessness in humans: an attributional analysis. In J. Garber & M. Seligman (Eds.), Human Helplessness: Theory and Applications. New York: Academic Press.

Abramson, L. Y., Seligman, M., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. Journal of Abnormal Psychology, 87, 49-74.

Anastasi, A. (1976) Psychological Testing (4th. ed). New York: Macmillan.

Anderson, A., & Moore, O. (1960). Autotelic folk-models. Sociological Quarterly, 1, 203-216.

Arlin, M. (1975). The interaction of locus of control, classroom structure, and pupil satisfaction. Psychology in the Schools. 12, 279-286.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavior change. Psychological Review, 84, 191-215.

Baum, A., Aiello, J. R., & Calenick, L. E. (1978). Crowding and personal control: social density and the development of learned helplessness. Journal of Personality and Social Psychology, 36, 1000-1011.

Baron, R. & Ganz, R. (1972). Effects of locus of control and type of feedback on the task performance of lower-class, black children. Journal of Personality and Social Psychology, 21, 124-130.

Bar-Tal, D., & Bar-Zohar, Y. (1977). The relationship between perception of locus control and academic achievement. Contemporary Educational Psychology, 2, 181-199.

Blanck, P.D., Reis, H. T., & Jackson, L. (1984). The effects of verbal reinforcements on intrinsic motivation for sex-linked tasks. Sex Roles, 10, 369-387.

Blechman, E. A., & Dannemiller, E. A. (1976). Effects on performance of perceived control over noxious noise. Journal of Consulting and Clinical Psychology, 44, 601-607.

Brecher, M. & Denmark, F. L. (1969). Internal-external locus of control and verbal fluency. Psychological Reports, 25, 707-710.

Calder, B.J. & Staw, B. (1975). Self-perception of intrinsic and extrinsic motivation. Journal of Personality and Social Psychology, 31, 76-80.

Chance, J. E. (1965). Internal control of reinforcements and the school learning process. Paper presented at Society for Research in Child Development Convention, Minneapolis.

Clark, B. (1979). Growing up Gifted. Columbus: Charles E. Merrill.

Clifford, M. & Cleary, T. (1972). The relationship between children's academic performance and achievement accountability, Child Development, 43, 647-655.

Cohn, S. (1981). What is giftedness? A multi dimensional approach. In A.H. Kramer (Ed.) Gifted children. New York: Trillium Press.

Cornell, J. P. (in press). A new multidimensional measure of children's perceptions of control. Child Development.

Crandall, V. C., & Lacey, B. (1972). Children's perceptions of internal-external control in intellectual-academic situations and their embedded figures test performance. Child Development, 43, (4), 1123-1134.

Crandall, V. C., Katkovsky, W., & Crandall, V. J. (1965). Children's beliefs in their control of reinforcements in intellectual academic achievement behaviors. Child Development, 36, 91-109.

Crandall, V. C., Katkovsky, W., & Preston, A. (1962). Motivational and ability determinants of young children's intellectual academic achievement situations. Child Development, 33, 643-661.

Cromwell, R. L. (1963). A social learning approach to mental retardation. In N. Ellis (Ed.), Handbook of mental deficiency. New York: McGraw-Hill.

Csikszentmihalyi, M. (1975) Beyond boredom and anxiety: The experience of play in work and games. San Fransisco: Jossey-Bass Publishers.

Daniels, P. (1983). Teaching the Gifted/Learning Disabled Child. London: Aspen Publications.

De Charms, R. (1968). Personal Causation: The Internal Affective Determinants of Behavior. New York: Academic Press.

Davis, H. B. & Connell, J. P. (1985). The effects of aptitude and achievement status on the self-system, Gifted Child Quarterly, 29, (3), 131-136.

De Charms, R. (1981). Personal causation and locus of control: Two different traditions and two uncorrelated measures. In H. Lefcourt (Ed.), Research with the Locus of Control Construct: Volume I. New York: Academic Press.

Deci, E. L. (1971). Effects of externally mediated rewards of intrinsic motivation. Journal of Personality and Social Psychology, 18, 105-115.

Deci, E. L. (1975). Intrinsic Motivation. New York: Plenum Press.

Deci, E. L., Betley, G., Kahle, J., Abrams, L., & Porac, J. (1981). When trying to win: Competition and intrinsic motivation. Personality and Social Psychology Bulletin, 7, 79-83.

Deci, E. L., & Ryan, R. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. New York: Plenum Press.

Delisle, J. & Renzulli, J. (1982). The revolving door identification and programming model: Correlates of creative production. Gifted Child Quarterly, 26, (2), 89-95.

Dua, P. S. (1970). Comparison of the effects of behaviorally oriented action and psychotherapy reeducation on introversion-extraversion, emotionality, and internal-external control. Journal of Counseling Psychology, 17, 567-572.

DuCette, J. & Wolk, S. (1973). Cognitive and motivational correlates of generalized expectancies for control. Journal of Personality and Social Psychology, 40, 287-297.

Duke, M. P. & Nowicki, S. (1974). Locus of control and achievement - The confirmation of a theoretical expectation. Journal of Psychology, 87, 263-267.

Eden, D. (1975). Intrinsic and extrinsic rewards and motives: Replication and extension with Kibbutz workers. Journal of Applied Social Psychology, 5, 348-361.

Fincham, F. & Barling, J. (1978). Locus of control and generosity in learning disabled, normal achieving, and gifted children. Child Development, 49, 530-533.

Foulds, M., Guinan, J. F., & Warehime, R. G. (1974). Marathon group: changes in perceived locus of control. Journal of College Student Personnel, 15, 8-11.

French, J. (1959). Educating the Gifted. New York: Henry Holt & Co..

Gadzella, R., Williamson, D., & Ginther, D. (1985). Correlations of self-concept with locus of control and academic performance, Perceptual and Motor Skills, 61, 639-645.

Gallagher, J. (1975). Teaching the Gifted Child. (2nd. Ed.), Boston: Allyn & Bacon.

Gallagher, J. (1979). Issues in education for the gifted. In A. H. Passow (Ed.), The gifted and the talented: Their education and development. Chicago, IL: The University of Chicago Press.

Glass, D. C., Singer, J. E., & Friedman, L. N. (1969). Psychic cost of adaptation to an environmental stressor. Journal of Personality and Social Psychology, 7, 244-257.

Glass, D. C., Singer, J. E., Leonard, H. S., Krantz, D., Cohen, S., & Cummings, H. (1973). Perceived control of aversive stimulation and the reduction of stress responses. Journal of Personality, 41, 577-595.

Goldberg, M. (1965). Research on the Talented. New York: Bureau of Public Teachers College, Columbia University.

Harpin, P. M. (1980). Individual variability in behavior within a person-environment interactional design. Unpublished dissertation, Arizona State University.

Harpin, P. M., & Sandler, I. N. (1979). Interaction of sex, locus of control, and teacher control: Toward a student-classroom match. American Journal of Community Psychology, 7, 621-632.

Harrison, F. I. (1968). Relationship between home background, school success, and adolescent attitudes. Merrill-Palmer Quarterly of Behavior and Development, 14, 331-344.

Harvey, J. M. (1971). Locus of control shift in administrators. Perceptual and Motor Skills, 33, 980-982.

Horney, K. (1937). The Neurotic Personality of Our Time. New York: W.W. Norton & Co.

Houston, B. K. (1972). Control over stress, locus of control and response to stress. Journal of Personality and Social Psychology, 21, 249-255..

Hunt, J. (1965). Intrinsic motivation and its role in psychological development. In David Levine (Ed.), Nebraska Symposium on Motivation. Lincoln: University of Nebraska Press.

Ickes, W., & Layden, M. A. (1978). Attributional styles. In J. H. Harvey, W. J. Ickes, & R. F. Kidd (Eds.), New Directions in Attribution Research (Vol. 2). Hillsdale, N. J.: Lawrence Erlbaum Associates.

Jones, E. E., Kanouse, D., Kelley, H., Nisbett, R. Valins, S., & Weiner, B. (1972). Attribution: Perceiving the Causes of Behavior. Morristown, N.J.: General Learning Press.

Jones, E. E. & Nisbett, R.E. (1972). The actor and the observer: Divergent perceptions of the causes of behavior. In E. E. Jones et al. (Eds.), Attribution: Perceiving the Causes of Behavior. Morristown, N.J.: General Learning Press.

Kanoy, R., Johnson, B. & Kanoy, K. (1980). Locus of control and self-concept in achieving and underachieving bright elementary students, Psychology in the Schools, 17, (3), 395-399.

Karnes, M., McCoy, G., Zehrbach, R., Wollersheim, J., & Clarizio, H. (1962). The Efficacy of Two Organizational Plans for Underachieving Intellectually Gifted Children. Report to the Champaign Community Unit Schools No. 4, Champaign, Illinois.

Katz, I. (1967). The socialization of academic motivation in minority group children. In D. Levine (Ed.), Nebraska Symposium on Motivation. Lincoln, Nebraska: University of Nebraska Press.

Kirk, S. (1972). Educating Exceptional Children. (2nd. ed.) Boston: Houghton Miffin Co.

Koch, S. (1956). Behavior as intrinsically regulated: Work notes towards a pre-theory of phenomena called motivational. In Marshall R. Jones (Ed.), Nebraska Symposium on Motivation, Vol 4. Lincoln: University of Nebraska Press.

Kruglanski, A., Riten, A., Amitai, A., Margolin, B., Shabtai, L., & Zaksh, D. (1975). Can money enhance intrinsic motivation?: A test of the content-consequence hypothesis. Journal of Personality and Social Psychology, 31, 699-705.

Lefcourt, H. (1976). Locus of Control: Current Trends in Theory and Research. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Lefcourt, H (1982). Locus of Control: Current Trends in Theory and Research (2nd Ed). London: Lawrence Erlbaum Associates.

Lepper, M.R. & Greene, D. (1976). On understanding overjustification: A reply to Reiss and Suschinsky. Journal of Personality and Social Psychology, 33, 25-35.

Lepper, M., Greene, D., & Nisbett, R. (1973). Undermining children's intrinsic interest with extrinsic rewards: A test of the "overjustification" hypothesis. Journal of Personality and Social Psychology, 28, 129-137.

Lessing, E. (1969). Racial differences in indices of ego functioning relevant to academic achievement. Journal of Genetic Psychology, 115, 153-167.

Levenson, H. (1981). Differentiating among internality, powerful others, and chance. Research with Locus of Control: Assessment Methods, Vol 1, New York: Academic Press.

Liberman, B. L. (1978). The role of mastery in psychotherapy: Maintenance of improvement and prescriptive change. In J. D. Frank, R. Hoehn-Saric, S. D. Imber, B. L. Liberman, & A. R. Stone, Effective Ingredients of Successful Psychotherapy. New York: Brunner/Mazel.

Ludwigsen, K., & Rollins, H. (1971). Recognition of random forms as a function of source of cue, perceived locus of control, and socioeconomic level. Paper presented at Southeastern Psychological Association Convention, Miami Beach.

Mackler, B. (1962). Creativity and Life Style. Doctoral dissertation, University of Kansas, Lawrence.

McClelland, D. C., Atkinson, J. W., Clark, R., & Lowell, E. L. (1953). The Achievement Motive. New York: Appleton-Century-Crofts.

McGhee, P. E. & Crandall, V. C. (1968). Beliefs in internal-external control of reinforcement and academic performance. Child Development, 39, 91-102.

Messer, S. B. (1972). The relation of internal-external control to academic performance. Child Development, 43, 1456-1462.

Millar, G. (1981). Myths that plague the development and implementation of programs for the gifted and talented: A visual study. Special Education in Canada, 56, 12-13.

Newman, J., Dember, C., & Krug, O. (1973). He can but he won't. Psychoanalytic Study of the Child, 28, 83-129.

Nowicki, S. & Barnes, J. (1973). Effects of a structures camp experience on locus of control orientation. Journal of Genetic Psychology, 122, 247-252.

Overmier, J. B. & Seligman M. (1967). Effects of inescapable shock upon subsequent escape and avoidance responding. Journal of Comparative and Physiological Psychology, 31, 570-585.

Owens, R. E. (1964). The Relationship of Creative Thinking Ability to Extreme Over and Underachievement. Doctoral dissertation, Colorado State College, Greeley.

Parks, C., Becker, W., Chamberlain, J., & Crandall, J. M. (1975). Eliminating self-defeating behaviors and change in locus of control. Journal of Psychology, 91, 115-120.

Pervin, Lawrence (1975). Personality: Theory, Assessment and Research. New York: John Wiley & Sons Inc..

Powell, A. (1971). Alternative measures of locus of control and the prediction of academic performance, Psychological Reports, 29 47-50.

Pringle, M. L. (1970). Able misfits. London: Longman Group Ltd.

Pyryt, M. (1986). Using discriminant analysis to identify gifted children. Journal for the Education of the Gifted, 9, (3), 181-191.

Renzulli, J. (1978). Education! Who needs it? Yearbook of Special Education. Chicago: Marquis Academic Press, 467-80.

Reynolds, C. (1984). Critical Measurement Issues in Learning Disabilities, The Journal of Special Education, 18, (4), 1-26.

Ross, M. (1975). Salience of reward and intrinsic motivation. Journal of Personality and Social Psychology, 32, 245-254.

Ross, M., Karniol, R. & Rothstein, M. (1976). Reward contingency and intrinsic motivation in children: A test of the delay of gratification hypothesis. Journal of Personality and Social Psychology, 32, 245-254.

Rotter, J. (1954). Social Learning and Clinical Psychology. Englewood Cliffs, New Jersey: Prentice-Hall.

Rotter, J. (1966). Generalized expectancies for internal vs. external control of reinforcement. Psychological Monographs, 80, 1, Whole No. 609.

Rotter, J. , Chance, J. E., & Phares, E. (1972). Applications of a Social Learning Theory of Personality. New York: Holt, Rinehart & Winston.

Rupp, M., & Nowicki, S. (1978). Locus of control among Hungarian children. Journal of Cross Cultural Psychology, 9, 359-366.

Seeman, M. (1963). Alienation and social learning in a reformatory. American Journal of Sociology, 69, 270-284.

Seeman, M., & Evans, J. W. (1962). Alienation and learning in a hospital setting. American Sociological Review, 27, 772-783.

Seligman, M. (1975). Helplessness. San Fransisco: W. H. Freeman.

Seligman, M., Maier, S. F., & Solomon, R. L. (1969). Unpredictable and uncontrollable aversive events. In F. R. Brush (Ed.), Aversive Conditioning and Learning. New York: Academic Press.

Shaver, K. G (1975). An Introduction to Attribution Processes. Cambridge, Mass.: Winthrop Publishers Inc..

Sherman, M. R., Pelletier, R. J., & Ryckman, R. M. (1973). Replication of the relationship between dogmatism and locus of control. Psychological Reports, 33, 749-750.

Stanley, T. (1986). Regression discontinuity: Integrating Research and program design in programs for the gifted. Journal for the Education of the Gifted, 9, (3), 181-191.

Staub, E., Tursky, B., & Schwartz, G. E. (1971). Self-control and predictability: Their effects on reactions to aversive stimulation. Journal of Personality and Social Psychology, 18, 157-162.

Stephens, M. W. (1973). Parent behavior antecedents, cognitive correlates and multidimensionality of locus of control in young children. Paper presented at American Psychological Association Convention, Montreal.

Strodtbeck, F. L. (1958). Family interaction, values and achievement. In D. C. McClelland (Ed.), Talent and Society. New York: Nostrand.

Thorndike, R. (1963). The concepts of over- and under- achievement. NYC: Teachers College Press, Columbia University.

Tidwell, R. (1980). A psycho-educational profile of 1,593 gifted high school students. Gifted Child Quarterly, 24, (2), 63-68.

Torrance, P. E. (1966). Torrance Tests of Creative Thinking: Norms-Technical Manual. New Jersey: Personnel Press, Inc..

U. S. Office of Education (1981). Education consolidation act. PL 97-35 (Sec. 582).

Weinberg, R. S., & Jackson, A. (1979). Competition and extrinsic rewards: Effect on intrinsic motivation and attribution. Research Quarterly, 50, 503-510.

Weiner, B. (1972). Theories of Motivation: From Mechanism to Cognition. Chicago: Rand McNally College Publishing Company.

Weiner, B., Heckhausen, H., Meyer, W., & Cook, R. E. (1972). Causal ascriptions and achievement motivation. Journal of Personality and Social Psychology, 21, 239-248.

Whitmore, J. R. (1980). Giftedness, conflict & underachievement. Boston: Allyn & Bacon, Inc.

Williams, J. G., & Stack, J. J. (1972). Internal-external control as a situational variable in determining information-seeking by Negro students. Journal of Consulting and Clinical Psychology, 39, 187-193.

Willson, V. L. & Reynolds, C. (1984). Another look at evaluating aptitude-achievement discrepancies in the diagnosis of learning disabilities, The Journal of Special Education, 18, (4), 26-44.

White, R. W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66, 297-333.

Wolk, S & Eliot, J. (1974). Information-generated influence as a function of locus-of-control patterns in children, Child Development, 45, (4), 928-934.

Wong, P. & Sproule, C. (1984). An attribution analysis of the locus of control construct and the Trent Attribution Profile. In H. Lefcourt (Ed.), Research with the Locus of Control Construct: Volume III, New York: Academic Press.

Wright, R. J., & DuCette, J. P. (1976). Locus of Control and Academic Achievement in Traditional and Non-Traditional Settings. Paper presented at American Education Research Association Convention, San Fransisco.

Zimmerman, D. & Williams, R. H. (1982). The relative error magnitude in three measures of change, Psycometrika, 47, 141-147.

APPENDIX I

THE CRANDALL INTELLECTUAL ACHIEVEMENT RESPONSIBILITY QUESTIONNAIRE

Internal locus of control responses are designated by an I. These are further subdivided by a plus and negative sign depending on whether the event was positive or negative. The total score is obtained by summing all positive events for which the individual assumes credit and the negative events for which blame is assumed. The total I score is the sum of I^+ and I^- subscores.

The I.A.R. Scale

1. If a teacher passes you to the next grade, would it probably be

   (a) because she liked you, or
   I^+ (b) because of the work you did?

2. When you do well on a test at school, is it more likely to be

   I^+ (a) because you studied for it, or
   (b) because the test was especially easy?

3. When you have trouble understanding something in school, is it usually

   (a) because the teacher didn't explain it clearly, or
   I^- (b) because you didn't listen carefully?

4. When you read a story and can't remember much of it, is it usually

   (a) because the story wasn't well written, or
   I^- (b) because you weren't interested in the story?

5. Suppose your parents say you are doing well in school. Is it likely to happen

   I^+ (a) because your school work is good, or
   (b) because they are in a good mood?

6. Suppose you did better than usual in a subject at school. Would it probably happen

   I^+ (a) because you tried harder, or
   (b) because someone helped you?

7. When you lose at a game of cards or checkers, does it usually happen

   (a) because the other player is good at the game, or
   I^- (b) because you don't play well?

8. Suppose a person doesn't think you are very bright or clever

I- (a) Can you make him change his mind if you try to, or
(b) are there some people who will think you're not very bright no matter what you do?

9. If you solve a puzzle quickly, is it

(a) because it wasn't a very hard puzzle, or
I+ (b) because you worked on it carefully?

10. If a boy or girl tells you that you are dumb, is it more likely that they say that

(a) because they are mad at you, or
I- (b) because what you did really wasn't very bright?

11. Suppose you study to become a teacher, scientist, or doctor and you fail. Do you think this would happen

I- (a) because you didn't work hard enough, or
(b) because you needed some help and other people didn't give it to you?

12. When you learn something quickly in school, is it usually

I+ (a) because you paid close attention, or
(b) because the teacher explained it clearly?

13. If a teacher says to you, "Your work is fine," is it

(a) something teachers usually say to encourage pupils, or
I+ (b) because you did a good job?

14. When you find it hard to work arithmetic or math problems at school, is it

I- (a) because you didn't study well enough before you tried them, or
(b) because the teacher gave problems that were too hard?

15. When you forget something you heard in class, is it

(a) because the teacher didn't explain it very well, or
I- (b) because you didn't try very hard to remember?

16. Suppose you weren't sure about the answer to a question your teacher asked you, but you answer turned out to be right. Is it likely to happen

(a) because she wasn't as particular as usual, or
I+ (b) because you gave the best answer you could think of?

17. When you read a story and remember most of it, is it usually

I+ (a) because you were interested in the story, or
(b) because the story was well written?

18. If your parents tell you you're acting silly and not thinking clearly, is it more likely to be

I- (a) because of something you did, or
(b) because they happen to be feeling cranky?

19. When you don't do well on a test at school, is it

(a) because the test was especially hard, or
I- (b) because you didn't study for it?

20. When you win at a game of cards or checkers, does it happen

I+ (a) because you play real well, or
(b) because the other person doesn't play well?

21. If people think you're bright or clever, is it

(a) because they happen to like you, or
I+ (b) because you usually act that way?

22. If a teacher didn't pass you to the next grade, would it probably be

(a) because she "had it in for you," or
I- (b) because your school work wasn't good enough?

23. Suppose you don't do as well as usual in a subject at school. Would this probably happen

I- (a) because you weren't as careful as usual, or
(b) because somebody bothered you and kept you from working?

24. If a boy or girl tells you that you are bright, is it usually

I+ (a) because you thought up a good idea, or
(b) because they like you?

25. Suppose you became a famous teacher, scientist or doctor. Do you think this would happen

(a) because other people helped you when you needed it, or
I+ (b) because you worked hard?

26. Suppose your parents say you aren't doing well in your school work. Is this likely to happen more

I- (a) because your work isn't very good. or
(b) because they are feeling cranky?

27. Suppose you are showing a friend how to play a game and he has trouble with it. Would that happen

(a) because he wasn't able to understand how to play, or
I- (b) because you couldn't explain it well?

28. When you find it easy to work arithmetic or math problems at school, is it usually

(a) because the teacher gave you especially easy problems, or
I+ (b) because you studied your book well before you tried them?

29. When you remember something you heard in class, is it usually

I+ (a) because you tried hard to remember, or
(b) because the teacher explained it well?

30. If you can't work a puzzle, is it more likely to happen

I- (a) because you are not especially good at working puzzles, or
(b) because the instructions weren't written clearly enough?

31. If your parents tell you that you are bright or clever, is it more likely

(a) because they are feeling good, or
I+ (b) because of something you did?

32. Suppose you are explaining how to play a game to a friend and he learns quickly. Would that happen more often

I+ (a) because you explained it well, or
(b) because he was able to understand it?

33. Suppose you're not sure about the answer to a question your teacher asks you and the answer you give turns out to be wrong. Is it likely to happen

(a) because she was more particular than usual, or
I- (b) because you answered too quickly?

34. If a teacher says to you, "Try to do better," would it be

(a) because this is something she might say to get pupils to try harder, or
I- (b) because your work wasn't as good as usual?

From Crandall, Katkovsky, and Crandall (1965)

APPENDIX II

TORRANCE TESTS OF CREATIVITY (UNUSUAL USES)
Form A

UNUSUAL USES (Cardboard Boxes)

Most people throw their empty cardboard boxes away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of box. Your may use as many boxes as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. _____

2. _____

3. _____

etc.

TORRANCE TESTS OF CREATIVITY (UNUSUAL USES)
Form B

UNUSUAL USES (Tin Cans)

Most people throw their tin cans away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of can. Your may use as many cans as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. _____

2. _____

3. _____

etc.

APPENDIX III

MEANS AND STANDARD DEVIATIONS OF DEPENDENT MEASURES

Total Internal Locus of Control

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
25.134	3.519	.275	12.387	14.003	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	*** Missing:**
13	32	19	4122	105622	0

Mode: 27

Positive Internal Locus of Control

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
13.646	2.113	.165	4.463	15.481	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	*** Missing:**
7	17	10	2238	31268	0

Mode: 14

Negative Internal Locus of Control

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
11.488	2.508	.196	6.288	21.829	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	*** Missing:**
1	16	15	1884	22668	0

Mode: 13

First Unusual Uses Task

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
12.854	5.003	.391	25.034	38.926	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	*** Missing:**
5	31	26	2108	31176	0

Mode: 10

Second Unusual Uses Task

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
16.604	6.426	.502	41.296	38.703	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	**# Missing:**
6	34	28	2723	51943	0

Mode:

•

Locus of Causality

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
3.75	5.51	.43	30.36	146.934	164
Minimum:	**Maximum:**	**Range:**	**Sum:**	**Sum Squared:**	**# Missing:**
-11	25	36	615	7255	0

Mode:

3